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Open Cars *are* Still *on* Decline *But* Their *End Isn't Yet*

Output so far this year has dropped off 13 per cent as compared with 1926, but relatively good market still exists for flashy sport models.

By Norman G. Shidle

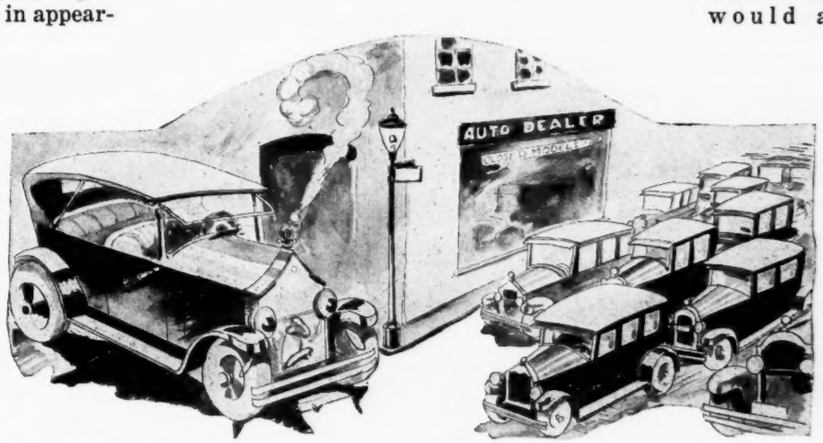
SOME automotive choruses have been singing the swan song of the open car for several years. There are men in the industry right now who firmly believe that the consistent march of the closed type, which has been going forward for a good while, will continue until the open car becomes as scarce as National League pennants in Philadelphia. But even the members of this school of thought still see plenty of decrepit old touring cars or sparkling new open sport jobs holding them up or spinning by them on the open road every time they go riding themselves.

Within the past 12 months, moreover, hours of earnest and productive design effort have been applied to bodies of the open type, some of the most striking creations of the *carrossiers* this year being various kinds of open jobs, usually of the sport type. The time and money which a number of makers have invested in developing new open body designs, flashy in appearance and delectable to the eye would indicate an equally firm belief on their part that some niche still remains and will continue to remain for the open body.

No one can study the figures on open and closed body sales even superficially, of course, without recognizing very clearly that the percentage of total production comprised of closed bodies, growing for many years, now has reached a thoroughly predominant position. Last year 75 per cent of all the cars built were closed and this year with the irregular and difficult-to-calculate Ford output left out of consideration, closed models will account for something between 85 and 90 per cent of the total production.

During the first six months of this year, too, open car production declined not only proportionately to the total, but in actual number of units. Leaving Ford out of consideration again, it appears that closed car production for the first half of 1927 was greater than that of the same period last year. Open car output, on the other hand, dropped off nearly 13 per cent. If estimates of the Ford division between open and closed be included, the decline in open models probably would be as much as 35 per cent as compared with the first half of last year. Thus, it would appear from the figures at hand that the predominance of the closed car so far in 1927 not only has been continued, but that it has been considerably accelerated as well.

In view of these facts, how does it come about that many casual observers will tell you that they are noticing more open cars this year than they did



Despite the fact that it has to a large extent been crowded off the road by closed models, the open car still sells in the ratio of about 1 to 4 and apparently is in no immediate danger of becoming extinct

last, particularly roadsters? And how does it come about that a number of manufacturers, in the face of this tidal wave of closed car sales, think it worth while to lavish considerable time and money and effort on increasingly distinctive open designs?

The second question to a large extent answers the first. It is the great individuality, color and dash which are characteristic of the newer open jobs that bring these cars definitely to the attention of the average observer who bases an opinion only on what happens to impress itself on his eye and has no access to or knowledge of statistical data on the subject. The less striking cars which pass he is accustomed to, and doesn't particularly notice; the brilliant, delightful, open sport models—often with horns of wierd sound—register on his consciousness.

$600,000,000 Last Year

The answer to the second question probably can be expressed only in less definite terms; probably lies in a combination of factors which manufacturing executives may or may not have outlined to themselves in specific terms. To begin with, the present status and future possibilities of the open car can be properly analyzed only if it is examined by itself and not always in terms of its relation to closed car statistics. Despite the unquestioned decline of open car popularity in recent years, the American public last year paid to dealers something like $600,000,000 for new open cars, either phaetons or roadster models. Over half a billion dollars worth of open cars were sold by American and Canadian manufacturers during 1926. Taken by itself that figure is rather impressive; much more impressive than when it is stated that open cars comprised only about 25 per cent of the total dollar volume of business done last year.

Suppose that, due to the big slump in Ford production and the smaller decline in open car output for other lines, this figure were reduced to $400,000,000 for the year 1927. Even then the sum is sufficiently large to indicate a market well worth the serious consideration that many manufacturers are giving it. It is only about 15 years ago, one may recall, that the total wholesale value of all the types of cars and trucks built by the industry was $378,000,000. In that year, 1912, total car and truck production was 378,000; last year the production of roadsters alone was very close to 400,000. And in 1912 the automobile business was no longer regarding itself as an industrial infant.

Whatever the value of these comparisons—and they may have very little after all—it is interesting to note that about 1,100,000 open passenger cars were produced in the United States and Canada in 1926, and that something like 640,000 of them were built during the first six months. In the first six months of this year, the total output of open cars may be estimated as in the neighborhood of 400,000. With Ford back in the market actively during the last half, the division of his output will influence strongly the total open car production for the year and doubtless will be the major factor in determining whether or not it reaches nearly to last year's total.

Future Possibilities

The future possibilities for sale of the open car may properly be discussed even with full recognition of the fact that the closed car percentage of total output will continue to mount in the future as it has in the past.

To begin with, the type of constructive effort that manufacturers are putting into open car design today may be expected to help the open car maintain its sales volume far better than otherwise would be the case. Its distinctive character will aid in maintaining demand for open cars among those who seek and get a sport as well as a utility value from the cars and to extend the market to others who might otherwise not be attracted to buy.

The market for new open cars from now on would seem to rest to a considerable extent on the following:

1. *The two-car family.*

   Where a family already has one car, probably a closed one, the second car is much more likely to be open. A number of people enjoy an open car more than they do a closed but feel the need of a closed job for its general utility values.

2. *The export market.*

   Closed cars have not yet become as popular in foreign markets as they have at home. A good demand for open models still exists in many countries and probably will continue for some time to come, despite the growing demand for closed types abroad as at home.

3. *The style element.*

   Thus far, at least, it would seem that body designers have been able to put into open bodies more of what perhaps may be described as "class" (for want of a better term) than they have into closed types. There always have been and always will be a certain number of people who want nearly a maximum of that element; to them the average open car will have a greater appeal than the average closed job.

4. *The temperature factor.*

   It is interesting to speculate on the fact that those areas of the United States which still have the least dense automobile population are, for the most part, in sections where the average temperature is fairly high all year round. Perhaps this factor may be counted on the favorable side of the ledger for the open car as regards future sales. Little could be said on this subject, however, without reference to figures showing open and closed car sales by states, which we do not happen to have seen compiled for the country as a whole over any considerable period of time.

5. *The natural appeal of the open car.*

   That is finally that small body of people who just naturally like an open car well enough to put up with the inconveniences which come with it under almost any circumstances. These, some executives will tell you, are made up for the most part of young people and first-time buyers. To them, however, must be added that small residue of older enthusiasts who don't amount to much as a market for automobiles but who get a great lot of fun out of the ones they do own.

Whether or not these five elements will continue to contain enough buyers to make the production and sales of open cars always worth serious time and attention from manufacturers, only time will tell. There are strong indications, however, that the open car never will be entirely displaced by the closed and that, for this type of vehicle there will always remain a market sufficiently large in dollars and cents to make it well worth the consideration of car builders.

Delage *Adopts* L-Head Engine *for New* Six-Cylinder Car

Latest model of French builder unites best qualities of American design with finest in European practice. Flexibility and acceleration are features.

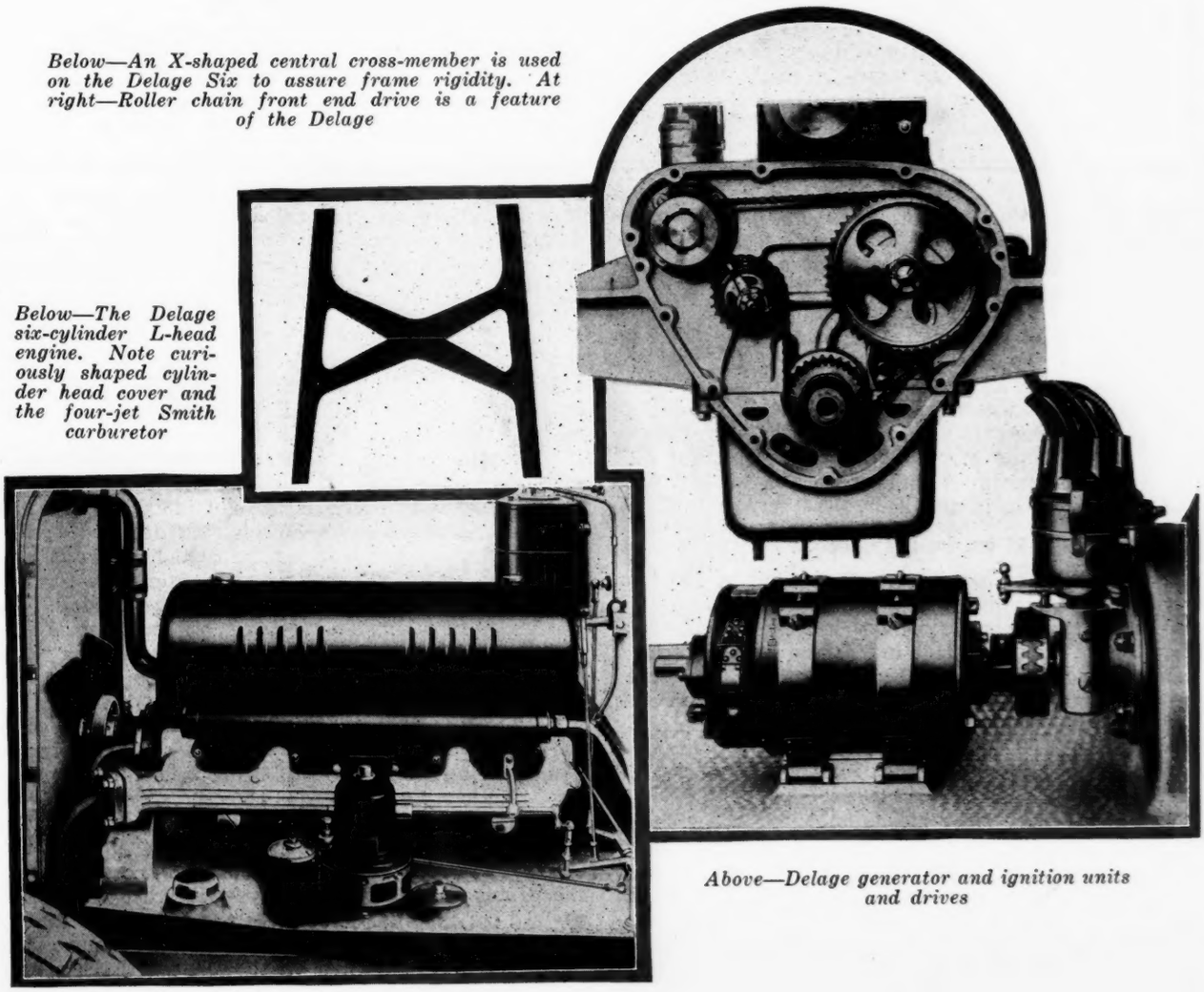
By W. F. Bradley

DESIGNED to unite the best qualities of American cars with the finest in European practice, the new six-cylinder Delage intended to be presented at the forthcoming Paris Salon is in many respects a break-away from the firm's previous practice. It is considered that a road speed of 60 m.p.h. is sufficient to meet the requirements of most users. This speed is easily maintained, for with a final gear ratio of 4.9 to 1 and tires of 775 by 145 mm., the car holds 100 kilometres (62 miles) at 3200 r.p.m. of the engine. There is no vibration and the engine remains silent up to this speed.

Flexibility and rapid acceleration are strong features. A series of acceleration tests made by the writer showed that the average time for accelerating from 25 to 50 m.p.h. was 18 3/5 sec. The best was 16 3/5 sec. and the most 21 3/5 sec.; the runs were made in two direc-

Below—An X-shaped central cross-member is used on the Delage Six to assure frame rigidity. At right—Roller chain front end drive is a feature of the Delage

Below—The Delage six-cylinder L-head engine. Note curiously shaped cylinder head cover and the four-jet Smith carburetor



Above—Delage generator and ignition units and drives

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NEXT season will be a six-cylinder year in Continental Europe. In some cases the 1928 models are ready to go into production, while in many other factories experimental work is sufficiently advanced for accurate forecasts to be made of the cars which will be presented at the fall show in Paris.

From 1928 the four-cylinder engine will practically have ceased to exist except for the cheaper models. Delage and Talbot already have announced six-cylinder types which ultimately will wipe out the four-cylinder models. Half a dozen other firms are known to be working on sixes. Renault will add two more cylinders to his present small model, thus obtaining a light six of practically 91 cu. in. piston displacement. While Citroen is not expected to announce any change during the forthcoming show, there is a strong probability that clients will be offered the alternative of a six-cylinder engine in the present chassis some time during 1928. In Italy the same attention is being paid to sixes as in France, and Fiat, it is declared, is ready to go into production on a new line with this number of cylinders. A little attention is being paid to straight eights, but these are all in the expensive class and it is doubtful if they will make their appearance this year.

Influenced by American competition, all the desire of manufacturers is for greater flexibility, good top gear performance and a high average speed with a maximum in the neighborhood of 60 m.p.h. It appears to be felt that the search for high maximum speed has been pushed too far.

The magneto will show a loss of position to generator ignition, this change having been made largely to get greater flexibility. There will be a slight falling off in the use of overhead valves, experience having shown that with a correctly designed turbulence head practically all the advantages of valves in head can be secured.

Four-wheel brakes having been general for several years, the only change in this respect is the more extended use of servo mechanisms. Close attention has been paid to steering layout and front suspension to eliminate shimmy and wheel wobble. Numbers of the new cars with semi-elliptic springs will have their shackles in front. Some interesting and successful attempts at weight reduction are to be expected.

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A test run was made from Paris to Grenoble, a distance of 338 miles, with only one gear shift, this being on an 8 per cent gradient in the lower Alps. The run started from the suburbs of Paris and included the crossing of several towns, the most important being Lyons, where it was necessary to come to a complete stop when trolley cars were taking up or setting down passengers. The average speed for the run was 40.3 m.p.h. and on the most difficult portion of the route 41.6 were covered in the hour.

153 cu. in. Displacement

The new Delage has six cylinders of 70 by 109 mm. bore and stroke, giving a piston displacement of 153 cu. in. and is an L-head type with a Ricardo combustion chamber. Previous Delage engines have had overhead valves. The magneto has been discarded in favor of generator ignition, the instrument used being of French construction. The spark plugs are mounted centrally in the head, and these being hidden by a detachable cover, the engine has all the appearance of an overhead valve type.

Front end drive is by means of double roller chain, this encircling the camshaft and the generator shaft pinions and having a tensioning sprocket on its outer face with external means of adjustment. The search for flexibility has led to the adoption of the Smith carburetor, which has four main jets and one idler. A perfectly straight intake manifold with six leads from it to the valve ports, and heated from the exhaust manifold, is made use of. Another Delage innovation is the use of a combined water pump and fan driven by a one-piece belt from the crankshaft.

The counterweighted main shaft, which is machined all over, is carried in seven plain bearings. Connecting rods are I-section and pistons are aluminum alloy. Lubrication is under high pressure to all bearings. The oil filter is on the left-hand crankcase web and is removable from above. A cock near the oil filter enables the sump to be emptied without getting under the engine. The quantity of oil in circulation is 1.6 U. S. gal.

The crankcase, which is an aluminum casting, has four point attachment to the side rails, the casting filling in all the space between the cylinder barrels and the frame. Clutch housing and transmission form a unit with the engine, as on previous models. A Desroziers type single-plate clutch, with the fabric material molded direct on the metal, thus avoiding the use of rivets, is made use of. There are four speeds and reverse with central change.

Rear axle construction has undergone no change compared with existing models, the axle housing being a banjo type and the driveshaft being inclosed. The rear semi-elliptic springs, shackled at both ends, are directly under the side rails. Among the changes made at the front end is the use of semi-elliptic springs with the shackles forward. Perrot front-wheel brakes are used, the drums being steel pressings with cast-iron liners pressed in; the aluminum shoes are faced with fabric. The four brakes are applied through a Dewandre vacuum type servo mounted on the side of the gearbox.

Heavy steel cables are used, there being a single cable for the two front wheels and separate cables for the rear brakes. There is no equalizer between front and rear sets. Personal tests showed that the car could be brought to a standstill from a speed of 25 m.p.h. in a distance of 20 ft.; at 37 m.p.h. it was pulled up in 62 ft. and the stopping distance at 50 m.p.h. was 134 ft.

The car on which these tests were made was fitted with a Weymann sedan body, for the construction of which Delage has taken out a license. With tanks filled, two spare wheels and tools aboard it weighed 3344 lb. It is claimed that changes decided on when the car is put into production will enable this weight to be reduced by 440 lb. Wheelbase is 128 in. and track 56 in. Selling price has not been announced. The car is low, for with an inside height of 44 in. the total height of the standard Weymann sedan is only 65 in., making the distance from the ground to the floor about 20 in.

Chrysler Reduces 4-*Cylinder* Prices With *Announcement* of "52"

Seven body models offered at prices ranging from $750 to $795. Better streamlining and new type manifold are chief features of higher speed line.

LOWER prices, with reductions ranging from $25 to $70, feature the announcement this week of its Model "52" four-cylinder line by the Chrysler Corp. Better streamlining, giving the appearance of decreased height, form-fitting seats, new interior and exterior finish, and a new type manifold are further features of the line. Seven body models are offered as follows:

5-pass. touring	$750
2-4-pass. roadster	725
2-pass. coupe	725
2-door, 5-pass. sedan	735
4-door, 5-pass. sedan	795
5-pass de luxe sedan	875

As its model number indicates, a top speed of 52 m.p.h. is claimed, while acceleration, according to the Chrysler Corp., is eight seconds from 5 to 25 m.p.h.

As on the "62" line recently announced, the "Red Head" high compression head is offered as standard equipment on the roadster, and is available at extra cost on the other body models. These heads are designed for use with anti-knock fuels. Featuring engine changes is a new down-draft type inlet manifold, including jacketed portion heated by exhaust gases. An air cleaner is provided on the carburetor air intake.

Bullet-Type Headlights

External appearance of the cars has been enhanced by the use of more sweeping streamlining. Cadet visors are standard on closed models, and all models have bullet-type headlamps. Rear roof curves have been rounded off more than formerly, while tops on the open cars are decidedly lower. Body colors differ for the various body models, greys, greens and blues being used with striped beadings and colored window reveals.

Visibility is improved in the "52" line through the adoption of narrower front pillars on the closed models, panels across the top of the windshields also being decreased in depth to increase visibility. Saddle-spring seat cushions have been adopted on all models to increase riding comfort. A new indirectly lighted instrument panel has been incorporated, similar to that used on the "62," and the Fedco number plate is now located above this panel immediately below the windshield.

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Another departure in design is the mounting of the water radiator, of the shuttered type, immediately below the fuselage, in the gap between the bottom of the fuselage and the wing leading edge. Air passes through this radiator, rises slightly and turns to right and left in passing through. The outlets for the air are located in the bottom of the fuselage and the fairing leading to the lower wings. This design should aid materially in decreasing head resistance.

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Now Possible to Measure "Normal" Pitch of Involute Gear

Instruments designed to gage distance between corresponding involute contours on consecutive teeth measured along a line perpendicular or normal to contours.

By B. Wheeler*
Westinghouse Electric & Mfg. Co.

THE "normal" pitch of an involute gear is the distance between corresponding involute contours on consecutive teeth measured along a line perpendicular or "normal" to the contours, as in Fig. 1. Proving to the characteristics of the involute form of tooth, the line along which the normal pitch is measured is tangent to the base circle, and its position up or down the faces of the teeth is immaterial as long as the conditions in the previous paragraph are satisfied.

The line of action of mating gears is tangent to the base circles, so that the normal pitch is also the pitch as measured along the line of action. It is, therefore, a direct indication of the nature of the engagement of the teeth of mating gears, especially with reference to premature engagement, delayed engagement, etc.

The first investigations made by the R. D. Nuttall Co. were studies primarily of tooth contour, although normal pitch was also measured. Ordinary tool room instruments were used and the principle was that shown in Fig. 2.

If a gear is mounted on a dividing head so that its axis is parallel to a surface plate, a line *a-b* can be found which is tangent to the base circle and perpendicular to the surface plate. A point *c* on this line can be considered the generating point for one side of a tooth if the line *a-b* is "unwrapped" from the base circle. A height gage is mounted on the surface plate so that its pillar is perpendicular to the plate and its contact point touches the tooth surface on the line *a-b*.

If the gear is rotated counter-clockwise through a known angle, the generating point *c* will move upward a corresponding distance which can be calculated from the angle of rotation and the radius of the base circle. The height gage must be also raised a certain amount to properly touch the tooth surface.

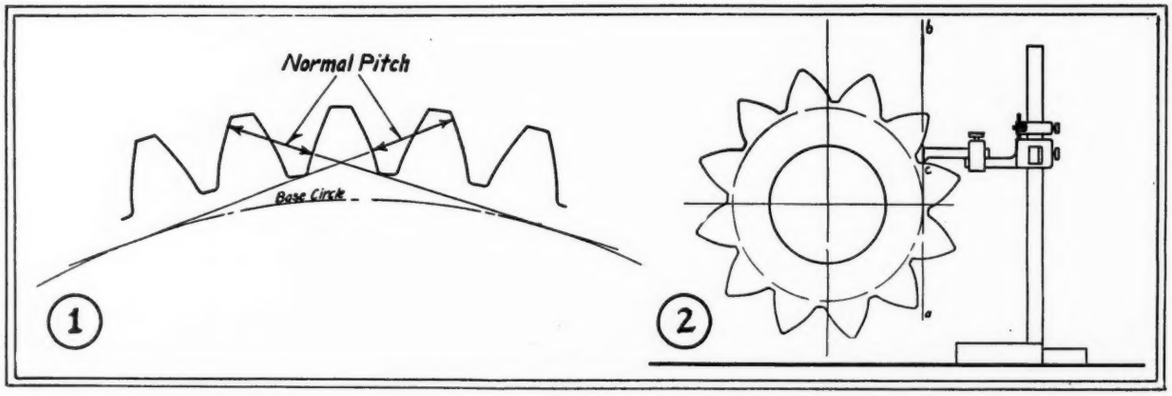
If the movement of the height gage is equal to the calculated movement of the generating point *c*, then the contour of the tooth is a true involute. If not, then the difference between calculated and actual movements is the error in contour.

Similarly, if the gear is held stationary and the height gage moved from one tooth to the next, the magnitude of movement is the normal pitch of the gear and may be compared with the calculated values.

So much for the principle. The actual procedure was as follows, the equipment being shown in Figs. 4 and 5.

Centers and a dividing head were mounted on a surface plate, blocked up, and centers carefully adjusted parallel to the plate. A parallel bar was clamped fast to the plate parallel to the line of centers and at a predetermined distance therefrom. This distance was found as follows:

The theoretical base circle radius was calculated for the gear to be measured. The gear was mounted on an arbor having ground surfaces from which to measure, while in the case of a pinion integral on its shaft the ground surfaces of the shaft were used to measure from. The problem was to fasten a pointer to touch the gear tooth in a plane which was tangent to the base circle and perpendicular to the surface plate. The pointer consisted of a sharp edge, whose back surface was square with its clamping surface, hence to the surface plate, carried on a height gage. The height gage was set up against the parallel bar while the back sur-



* Paper presented at the annual meeting of the American Gear Manufacturers Association at Jackson, Mich. Condensed.

face of the pointer rested against the ground surfaces on the arbor or shaft, the radius to the point of tangency to the shaft axis of rotation being in a plane parallel to the surface plate.

By inserting Johannsen blocks, between the height gage and parallel bar, the bar could be moved back a known distance. Removing the blocks, the bar having been clamped, the height gage could be brought back a known distance. This was done at both ends of the arbor about 3 ft. apart. These adjustments were made and all readings were then taken by inserting tissue paper between the contact fingers and the shaft surfaces. The pull on the paper can be measured more accurately than indicator fingers which may get out of order and are not so sensitive. The paper is about one-half a thousandth thick. Errors of this magnitude, when present in measurements taken at points 3 ft. apart, insure a sufficiently close approach to dead parallelism between parallel bar, face of gear, and center line of rotation.

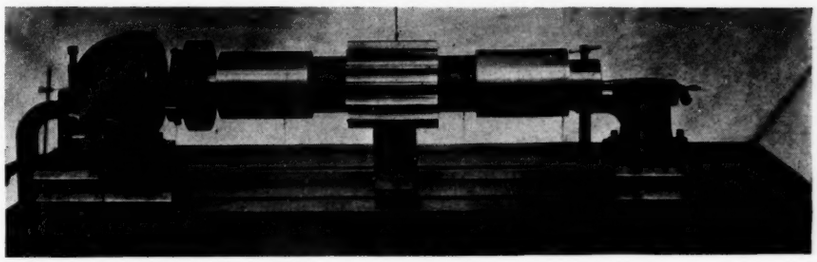


Fig. 4. Gear in position in dividing head for the measurement shown diagrammatically in Fig. 2

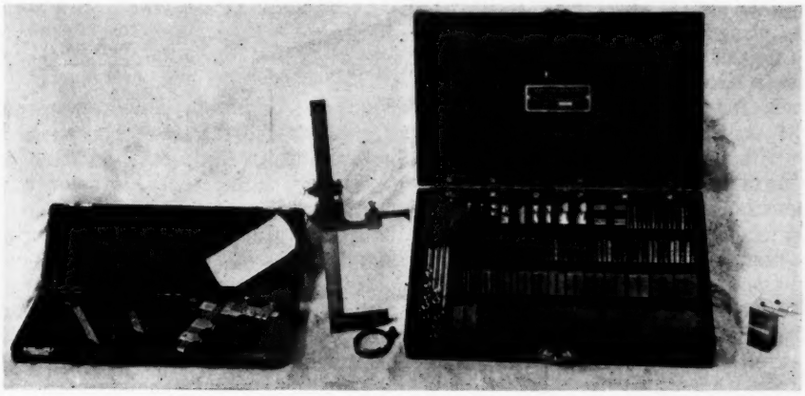


Fig. 5. Instruments for making measurement shown diagrammatically in Fig. 2

Knowing the diameters of the ground arbor surfaces and of the base circles, the pointer was set exactly in a plane which was tangent to the base circle, perpendicular to the surface plate and parallel to the axis of gear rotation. The base circle arc for one degree was now calculated. By means of the dividing head the gear could be rotated one or more degrees, as desired. Any rotation of the gear would compel the pointer to be adjusted vertically up or down into contact with the involute curve. It would be moved up or down a linear distance equal to the arc of rotation measured on the base circle, provided the involute contours were correct. Readings were taken on the gear for each one degree of rotation. The difference between the theoretical movement of the gear and the actual movement of the height gage showed the variation from true involute contour.

Measurements were then made of normal pitch in this same tangent plane, the gear being left stationary in this case. The difference between the movement of the height gage and the true normal pitch is a measurement of the normal pitch error.

Measurements were also taken on a gear for tooth thickness with tooth calipers. Since the O.D. might not be to size and might be slightly eccentric, the variation was determined by indicator reading for each tooth and the tooth calipers were changed as to chordal addendum to obtain the chordal tooth thickness at the same radial distance from the center of rotation.

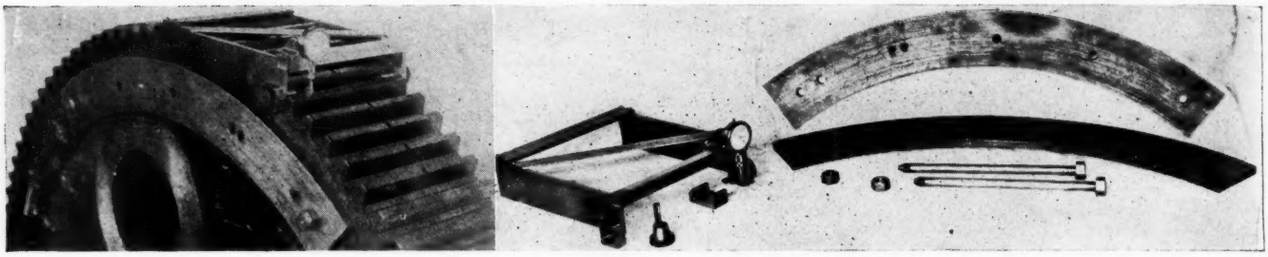
The methods described were arrived at only after a trial of flat fingers. It should be noted that when the upper side of a tooth is above center, the readings should be taken above center; when the under side of the tooth is being read, the contact should be below center. These positions permit flat surfaces to be perpendicular to the involute normals, i. e., the flat horizontal surface and the involute are tangent. Readings taken in the correct positions showed that even a flat surface contact gave less accurate results than the edge contact due to the tendency of flat surfaces to ride over holes in the contours and to rest on elevations at a point on the involute removed from the tangent plane. The point method has the objection that it must be sharp without a fillet at its contact edge or it could be presented to the involute contour at a point not in the tangent plane, due to the fillets. When made sharp and kept free from injury by paper in the manner described, it was found to be the most accurate method. Fingers with a flat contact surface at 20 deg. to the horizontal were tried out for 20 deg. pressure angle teeth, conatct then being made at the pitch line instead of at the base circle. They were open to the same objection as the other fingers with plane contact surfaces.

Not a Production Method

While this method of studying gear tooth shapes gave a very good indication of the condition of the involute contour anl also of the normal pitch, the measurement of even a small pinion was a slow and laborious process, not at all suited to commercial or production checking. Accumulated experience tended to show that accuracy of pitch was more important than correctness of contour and that, furthermore, satisfactory accuracy of contour was readily obtainable with the usual methods of hobbing or finish-grinding teeth. It is evident that this must be so as errors of normal pitch introduce impact effects, whereas errors of contour produced only acceleration effects.

The first attempt to design a device for the measurement of normal pitch on a production basis resulted in the instruments shown in Figs. 6 and 7.

Two segments, machined to the radius of the base circle of the gear to be measured, were clamped to the sides of the gear in such a position as to coincide with the theoretical base circle. A rectangular frame was constructed so that the contact point of a dial indicator and center of a plug in the side frame were in line with



Figs. 6 and 7. First apparatus specially designed for the measurement of normal pitch and its application to the gear

the lower sides of the side plates, as in Fig. 8.

When this frame was placed on the gear, as in Fig. 7, the plug and the contact point of the dial indicator were in contact with the teeth along a line tangent to the base circle, and the indicator reading showed the error in normal pitch. Fig. 9 shows the position of the plug and indicator contact point on the teeth and Fig. 10 shows the gage block used to set the indicator to zero at the theoretical dimension.

On the gears for which the particular normal pitch measuring instrument shown was designed, there were two separate rims and the teeth did not always exactly line up, hence two plugs were provided on the rectangular frame and the dial indicator was attached to a slide on a cross-bar so that either rim could be measured without interference from the other rim.

Experiments with this normal pitch measuring instrument disclosed the fact that the frame could be raised from the base circle segments a considerable amount without seriously affecting the accuracy of the readings.

Accuracy of Readings

A little study of the trigonometry of the problem disclosed the reason. The normal pitch to be measured is the distance *a-b* in Fig. 11 and the distance from the plug to the point of tangency on base circle is *b-c*. If the measuring instrument is, for some reason, not in the proper relation with respect to the base circle, we shall then have a line *a'-c'* at an angle *oc* to the correct location line *a-c*. The distance which the instrument now measures is *a'-b* which bears the relation to the correct distance *a-b*.

$$a'\text{-}b = \frac{a\text{-}b \text{ very nearly}}{\cos oc}$$

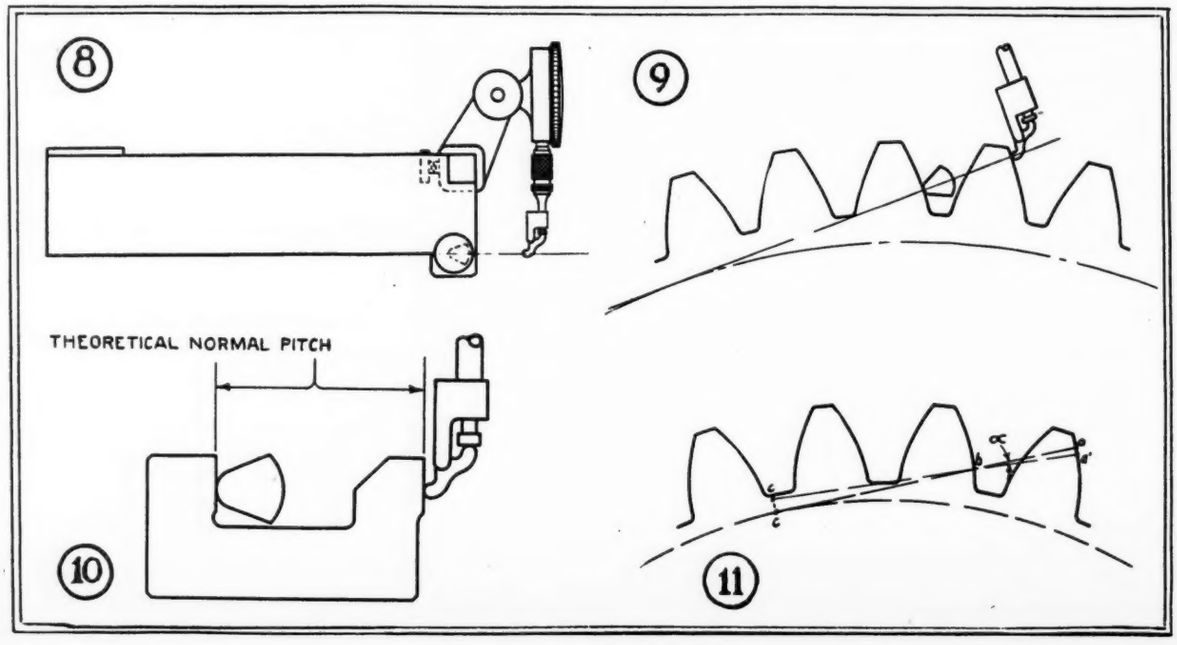
Since *cos oc* has a value very close to one for low values of *oc* the difference between *a'-b* and *a-b*, or the error due to incorrect location will increase fairly slowly as *oc* increases. However, the departure from the line tangent to the base circle, or the distance *d*, is equal to (*b-c* tan *oc*) which increases rapidly for small values of *oc*.

After investigation to determine the permissible departure from the theoretically correct position, a normal pitch instrument of the type shown in Fig. 12 was designed.

This instrument consists of a frame carrying a dial indicator with adjusting and clamping screws, a front foot carrying two hardened rollers, and a rear support to insure proper alignment. The machine is so laid out that when placed on the gear for which it is designed, one point of contact of the rollers and the point of contact of the dial indicator are in the proper position as shown in Fig. 13.

This instrument is much more convenient and adaptable than the original design. By changing the length of the rear support or the diameter of the roller, the same instrument may be used over quite a large range of numbers of teeth.

After using this instrument, it was found that for pinions with a few small teeth, especially if the pinion had been in service and had worn teeth, the use of a roller on the front foot for alignment was unsatisfac-



tory. The type of front foot shown in Fig. 14 was developed. In place of the contact being on a cylindrical surface, it is now on a knife edge located from the roots of the teeth. Variations in teeth thickness which would permit a roller to drop lower down between teeth and introduce errors have no effect on the location of the knife-edged type of foot. A disadvantage of this type is the difficulty of insuring proper contact on the tooth. The roller type of foot wedges between teeth with little effort, but the knife-edge type must be pulled back into contact, which requires more time and skill in taking readings. A flat spring to hold the knife-edge in contact is sometimes an aid in properly locating the instrument.

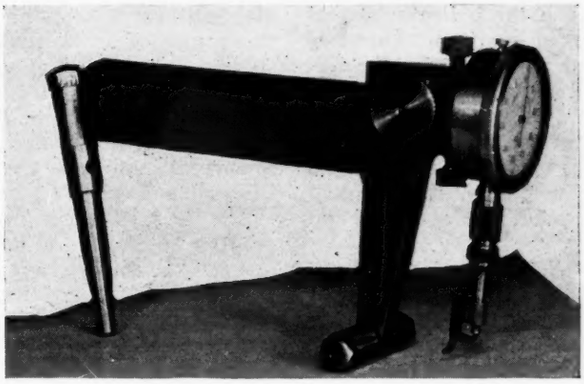


Fig. 12. More recent type of normal pitch measuring instrument

The successful use of the instruments previously described is dependent on their proper design and adjustment. If the line through the center of the roller or the knife edge and the contact point of the dial indicator is not tangent to the base circle of the gear being tested, then measurements are not being taken normal to the surfaces and the resulting readings will be incorrect.

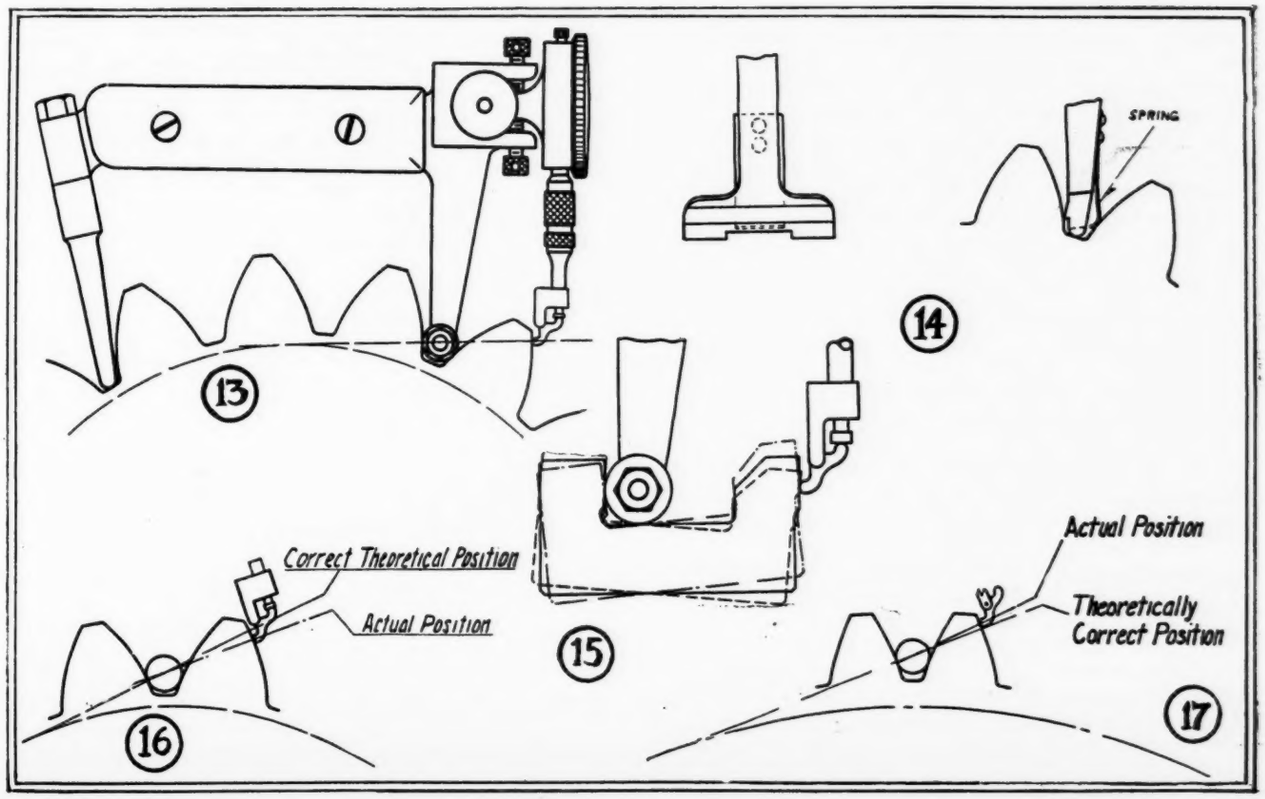
Examination will show that the perpendicular distance between corresponding tooth contours is the shortest distance between these surfaces. This distance is the normal pitch, which it is desired to measure. The instrument should be so adjusted that it gives a minimum reading.

When the instrument is being set to zero with a gage block, as in Fig. 15, the gage block is held in contact with the roller and rocked as shown by the dashed lines. As the block is moved from one extreme position to the other, the pointer on the indicator dial swings in a counter-clockwise direction to a certain minimum position and then reverses its direction. The same thing occurs as the block is rocked back again. This lowest reading is the shortest or perpendicular distance between the faces of the gage block and is the zero reading on the indicator for the particular gage block.

When the normal pitch instrument is placed on a gear with the rear support raised about ¾-in., there are three possible performances that may be observed as the gage is slowly rocked about the roller to bring the rear support down into contact between teeth. At the start, if the indicator was properly set at zero with the right gage block, the indicator will probably be reading plus. As the instrument is rocked to seat the rear support, the pointer will move over the dial counter-clockwise and:

1. Will still be moving and will stop suddenly as the rear support seats.
2. Will move a certain distance and start back before the rear support seats.
3. Will move more and more slowly as the rear support approaches its seat and will remain practically stationary as the last sixteenth of an inch or so of the rear support's motion is accomplished.

If condition No. 1 is observed, it signifies that the point of contact of the indicator has not come up enough and is as shown in Fig. 16.



In this case, the contact point of the indicator should be raised to bring it to the proper position. The nose of the indicator, the attachment which carries the bell crank, is clamped to the indicator spindle guide with a small chuck type clamp, the nut of which is the wide knurled portion on the upper part of the nose. If this clamp is loosened, the nose can be moved up or down relative to the indicator body and the point of contact located at any desired point within the range of adjustment.

If condition No. 2 is observed, it signifies that the point of contact of the indicator has passed the proper position and is as shown in Fig. 17.

In this case, the contact point of the indicator is too high and should be lowered as described in correcting for condition No. 1.

If condition No. 3 is observed, the actual point of contact is in the theoretically correct position and observed readings will be correct. Note that actual readings may not be plus in condition No. 1, minus in condition No. 2, or zero in condition No. 3. The correctness or otherwise of the readings is determined by the motions of the indicator point and not by the readings thmeselves.

Care should be taken in adjusting the nose on the dial indicator to keep the motion of the bell crank within the range of motion of the indicator spindle. The spindle has a travel of about 0.3 in. and the bell crank attachment about 0.1 in., so that the nose of the indicator may be moved about 0.1 in. and still operate properly. If this range of adjustment is not sufficient to correct conditions 1 and 2 previously described, then the rear support must be changed in length.

The fact that the minimum reading is the correct reading suggests a simple design for a measuring instrument to cover a wide range of numbers of teeth with no alterations or adjustments.

If a normal pitch instrument is made with only the indicator, a front foot with rollers and a handle, the instrument may be placed on a gear and rocked back and forth about the roller as a pivot. The indicator point will swing to a minimum as the proper position is reached, and back up again as it is passed. This minimum reading may be observed and will be the reading desired. So long as the roller wedges between teeth without bottoming and is small enough so that the point of the indicator does not run off the tip of the tooth before a minimum reading is reached, the readings will be correct irrespective of the number of teeth on the gear or pinion.

Artificial Wind Proposed for Airplane Fields

GIANT fans such as are used for ventilating mines, factories and public buildings soon will be installed in all modern airports to whip up 65-mile wind gales for the safe landing and "take off" of airplanes, according to aviation experts who have been interested in selecting a site for one of the most up-to-date landing fields in the United States.

The use of these big fans with other methods for scientifically controlling air conditions will make it possible for planes to land on the top of office buildings and department stores or within a city block and make the airplane nearly as convenient and readily accessible for daily use as the automobile, these fliers declare. The gale created by the blower fans will supply "braking power" for planes on the descent and further minimize the risks of ascending, it was explained.

Such leaders in the art of flying as Col. Charles Lindbergh, Maj. Eddie Rickenbacker, Capt. William H. Leininger and others all have watched with interest the safety devices that are being developed to make aviation "fool-proof." All are confident that the airplane will be the next big competitor of the automobile but visualize a machine which may travel by land or air and which, if some experiments succeed, will literally be a "flying automobile."

Rickenbacker, American ace of the World War, is strongly in favor of the multimotored plane. "The safe plane will have four motors," he said.

How controlled air may be applied for safety of landing planes was explained by Captain Leininger, who commanded a squadron of airplanes on the western front and was later Lindbergh's commanding officer in St. Louis.

"Any flier knows that it is easier to land in a gale of wind than it is in still air or dangerous cross currents of air known as eddies," Captain Leininger said. "Forced air, no matter whether it comes from a huge ventilating fan or from a breeze of Mothern Nature, will hold a plane up if aided by the correct kind of piloting. The wind gives braking power in landing and coming from a series of big fans would be the equivalent of four-wheel brakes on an automobile. It would help immeasurably in the ascent as, instead of taking off at an angle of 20 deg., it could be done at 50 deg.

"Instead of requiring a section of land to descend in, it could be done within a city block or on top of a building. This would aid materially in popularizing the airplane as it would eliminate the delays of coming in from the fields, and it is not visionary to forecast that people within a few years will use the airplane for shopping tours. The department stores will maintain special facilities on the tops of their buildings.

"For the average flying field, from 12 to 20 big fans could be used, arranged 10 ft. apart in horizontal and perpendicular sections which would be 200 ft. wide and 90 ft. high. The air would be forced or driven through a screen of steel bars 1 in. wide and 2 ft. apart. This would break up the eddies of air and help the pilot to land or take off.

"This method suggested for using controlled air for safety indicates that we are on the eve of some mighty important developments. A few years ago many would have challenged the statement that air could be used to cool motors. Yet, the air-cooled motor today has established its supremacy. One automobile manufacturer has successfully used it for years to cool his motor by simply keying a small blower fan to the end of his crankshaft."

ENDEAVORS to develop a native automobile industry with the aid of a protective tariff are being made in Sweden. That country in 1919 had only 8550 automobiles while last year the number had increased to more than 100,000. During 1925 no less than 17,271 cars were imported, of an aggregate value of 29,500,000 Swedish crowns.

At the present time there are three factories for automobiles in Sweden, Viz.: Scania-Vabis, Volve and Tidaholm. It is asserted that these are suffering greatly from foreign competition, owing to the low import duty of 15 per cent ad valorem. A bill has been introduced in the Swedish Parliament providing for doubling the duty for a number of years. Should this measure be rejected by Parliament it is planned to ask for a Government subsidy for the industry.

Foreign *Markets* Becoming *Important from Replacement* Standpoint

11.6 per cent of new motor vehicles sold in Australia during 1926 went to replace worn-out cars. Similar ratio in Italy. Lower in Canada and Argentina.

By I. H. Taylor,
Assistant Chief, Automotive Division, U. S. Bureau of Foreign and Domestic Commerce

DURING 1926, throughout the world outside the United States, the passenger cars, trucks and buses in use increased by about 974,960 units. Total production of foreign countries plus exports from the United States totaled about 1,154,578 units. Thus it seems evident that in these countries some 179,618 vehicles were required to replace those which were worn-out or for other reasons retired during 1925.

Replacement Markets in Some Foreign Countries

	Total Consumption	Registration Increase	Replacements	Per Cent of 1925 Registrations Replace	Per Cent of 1925 Registrations Increase
Canada	143,241	112,956	30,285	4.2	15.7
Argentina	49,513	44,560	4,958	2.7	25.0
Italy	36,258	23,477	12,781	11.1	20.4
Australia	108,186	74,439	33,947	11.6	25.5

Many very interesting conclusions that may serve as indexes to individual markets are to be arrived at in connection with the annual world census of motor vehicles sponsored by the Automotive Division of the U. S. Bureau of Foreign and Domestic Commerce. By adding production, if any, and imports, and subtracting the exports and possible re-exports, it is possible to arrive at the periodic consumption of automobiles in any given country.

Such a study of conditions in Italy would indicate that the market there is either insufficiently developed or that the lower purchasing power of the people has resulted in a momentary slackening of the advance to a higher per capita ownership of automobiles. The consumption of motor vehicles in Italy totaled 36,258 during 1926. The registration increase over 1925 was 23,477 or 20.4 per cent of consumption.

Of the cars consumed, 12,781 were to replace those in use in 1925 which were not in service during 1926. During the year 35.2 per cent of the supply was to replace cars taken out of service, while 64.8 per cent contributed to the registration increase.

In Canada consumption amounted to 143,241 units while the actual registration increase for the year 1926 was 112,956 or 15.7 per cent above the 1925 registrations. About 4.2 per cent, or 30,285 of the vehicles in use in 1925, had to be replaced. Replacement sales amounted to 21.1 per cent of total consumption.

As might be expected in the Argentine, a newer and hence more rapidly expanding market, registrations increased 25 per cent during 1926 over 1925. There were 49,518 vehicles absorbed in the country during last year. Of these, 44,560 or 90 per cent, represented a net increase, while 4958, only 2.7 per cent of the 1925 registrations, were required to take the place of cars which had been retired from service.

A study of the development of the motor vehicle market in Australia presents a number of interesting features. Properly speaking, it is a comparatively new market for automobiles since the general use of motor vehicles as an individually controlled means of transportation has evolved very rapidly during recent years. During the past three years, from January 1, 1924, to January 1, 1927, the number of automobiles in Australia has more than tripled, increasing from about 118,091 to 365,651 units.

Reliable estimates indicate that during 1926 Australia imported in assembled or unassembled state about 108,186 automobiles. The registration increase during 1926 was 74,439 or 25.5 per cent of the 1925 total. The balance of the automobiles consumed and not reflected in the registration increase evidently represents the number of cars that went out of service during 1925.

Of the total automobiles imported into Australia in 1926 it appears that 31.2 per cent were required to take the place of cars that were not registered after 1925 while 68.8 per cent accounted for the net increase in registrations. The conclusions reached above bear a marked resemblance to those applying to Italy. However, the development of the two automotive markets vary considerably, as is evidenced by the fact that in Australia there is one automobile to each group of 11 inhabitants while in Italy the ratio is about one vehicle to 293 inhabitants.

OUR attention is called by the Oakland Motor Car Co. to the fact that the correct name of the device combined with the fan drive pulley of the new Oakland engine is "harmonic balancer" and not "torsional vibration damper," as it was erroneously called in a caption in our issue of July 30.

Body Design Progress *an* Outgrowth *of* Improved *Construction*

Changes in design leading to more pleasing effects generally due to development of new methods and materials which give the builder more latitude in his work.

By George Mercer

BODY changes are most often considered from the design or appearance point of view only because it is more generally understood by the public. There are, however, general changes in construction and materials always going on and usually it is the construction changes that makes possible the design changes.

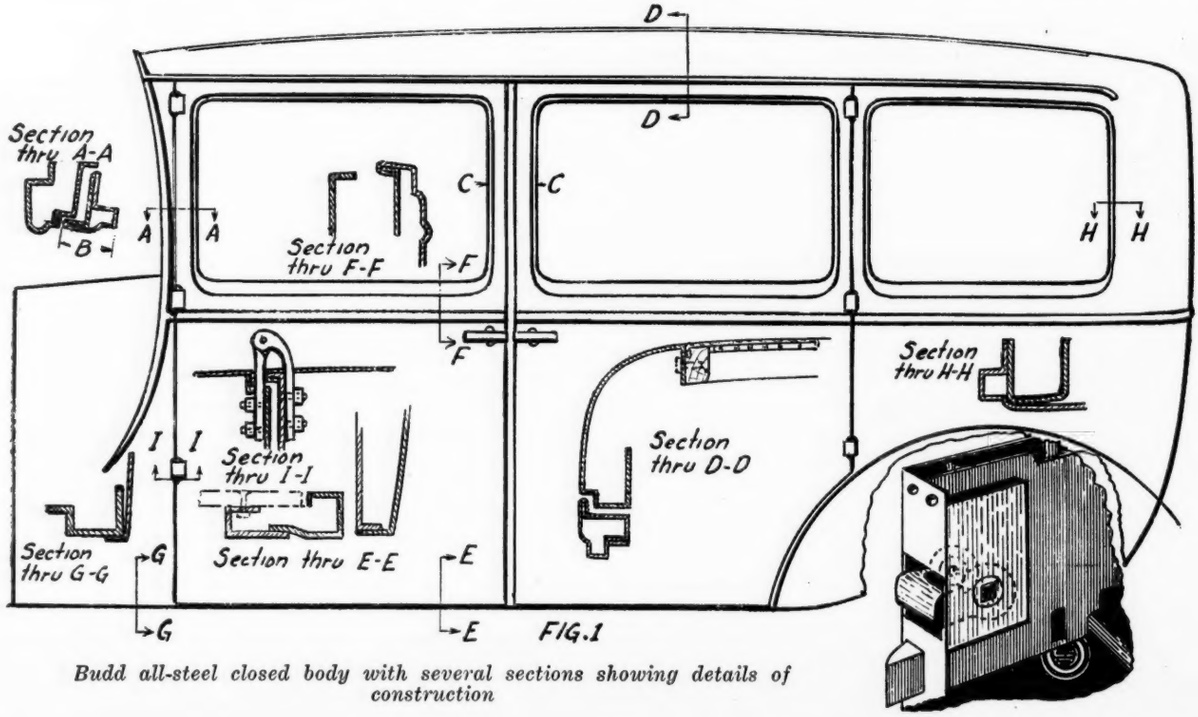
It is both interesting and instructive to review the construction changes in bodies, regarding them as the background on which efficiency in design is made possible. For the purpose of this article only those having conspicuous features are described, with particular reference to the all-steel and fabric bodies.

The composite body using metal for the panels and wood for the framing was the first important change from conventional carriage practice. This form of construction became standard practice and has continued up to the present time although there is a vast difference between the composite body of a few years ago and that made today.

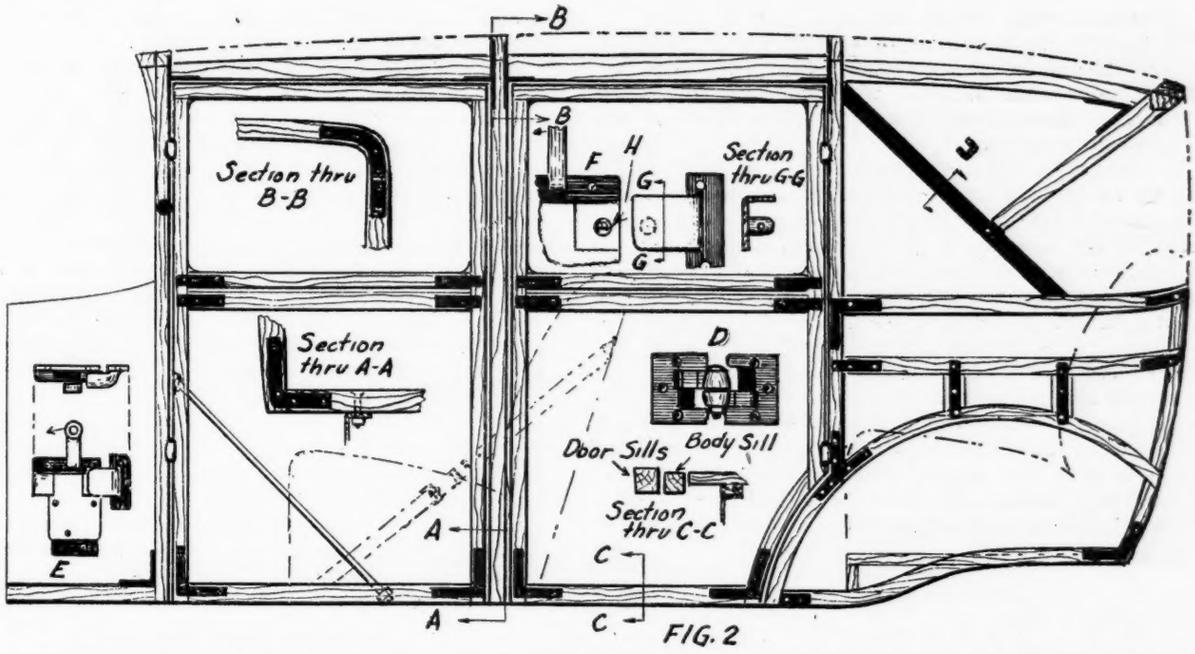
As early as 1900 European body builders used aluminum on the round corners and reverse curves where the use of wood was impractical and J. M. Quinby & Co., in 1903, brought out its all-aluminum panel body. In a few years steel replaced aluminum for all except special custom bodies and the trend has been to use steel to an ever increasing extent as a substitute for the wood frame members. Today the average composite body has less than one-third the amount of wood over the former practice.

The natural outcome of the tendency to use more steel has resulted in the development of the all-steel body and Fig. 1 illustrates a Budd closed body of this type with several sections showing details of construction. The all steel body was used by Dodge for its open models from 1915 on, but it was not until eight years later that the closed body of this form of construction was launched as a manufacturing proposition.

The most conspicuous advantage of this type of body is the clear vision which may be obtained with it. The section through *A-A* shows the door and front corner pillar and the space indicated by *B* can be as little as 1⅛ in. This same distance on a body with a wood pillar could not be less than 2⅛ in. The same advantage is found in the other pillars as is shown in section *C-C*. Allowing 1 in. between the door edges, this distance can be as little as 3¼ in.; with a composite body it would be 5¾ in. minimum, a difference of 2 in.



Budd all-steel closed body with several sections showing details of construction



Constructional details of a Weymann type fabric body, designed to flex with the chassis and to avoid squeaks

The lessened blank space in the all-steel body at *C-C* is made possible by a special type of door lock, since if the handle shank passed through in the usual manner the advantages of the narrow pillar at the lock side of the door could not be made use of. By use of a lock such as is illustrated at the lower right of Fig. 1, in which a yoke is used to form a connection between the handle and the lock bolt so that the runway channel is close up to the pillar jamb face, all the advantages of the narrow pillar can be utilized.

The sectional view through *D-D* shows a method of roof construction used with the latest type all-steel bodies. This consists of a rectangular soft center made with a light wood frame work and leather cloth tensioned over it. The metal part is turned down and the two bolted together as shown.

Door Construction

Sections *E-E* and *F-F* show the door construction at the belt and bottom. In the lower section, the wood floor board is shown in broken lines and it should be observed that the construction of the sill is quite different from that at section *G-G*.

Section *H-H* shows details of the reinforcement pillar at the back and *I-I* shows the method of assembling the hinges to the door and the body pillars.

On the better grade of all-steel bodies the trimming is fastened in place by tacking it to wood inserts. On the doors, however, it is customary to use metal screws. When all-steel bodies were first made the old methods of carriage painting were the custom and they were sent through bake ovens and enameled. Nowadays they are lacquered just like composite bodies.

Fig. 2 illustrates the constructional details of a Weymann type fabric body. Its designer, Charles T. Weymann, used his war-time aircraft experience in developing this body type and it was put on the market in Europe during 1922. This type of body is designed to flex with the chassis and to avoid squeaks. The frame members are of wood but are neither mortised nor lapped but are joined with steel plates that hold the ends of the wood pieces a slight distance apart.

There are no longitudinal through members, as with the conventional body, the main construction being cross framing represented by parallelograms formed by the body pillars and top and bottom cross-members. In Fig. 2 three of these are shown; one in front of the front door, one between the doors and one behind the rear door. These are set up separately and the longitudinal pieces fastened between them with plates.

Section *A-A* shows the lower corner of the middle parallelogram with its steel corner plate and shows how it is attached to the chassis by a small bolt. Section *B-B* shows the top corner of this same section.

Section *C-C* shows how the floor boards are fastened to the chassis without contact with the body sill. The seats are fastened to the floor, also, the back of the front seat being supported by an adjustable strap.

There are no rabbets in the door pillars; a molding covering the joint on the outside is depended upon to keep out the weather and, of course there is the usual trim binding covering the joint on the inside.

At *D* the hinge is illustrated. This consists of a ball and socket arrangement with a spring take-up within the hinge to relieve strain. There is also a tie-rod on the hinge side of the door which may be tightened to prevent sagging.

The door lock is shown at *E* in two views of the door and body part assembled. At *F* is an enlarged view of the door part section and the section through *G-G* shows the bolt of the lock to be stationary and attached to the body part of the lock. Through a hole in the bolt a locking pin operated by the handle holds the bolt when engaged in the round hole of the door part of the lock.

In this body the shroud is formed of aluminum sheet which is attached at only one end, fabric being fastened over this. There is also a double-threaded sleeve arrangement (not shown) which provides a flexible support for the windshield. The wood frame of the Weymann body is considerably lighter than customary. The covering material consists of duck tacked to the framing with horsehair pasted over it to give fullness and the fabric covering tensioned and tacked over the whole. Moldings are used to cover the tack heads.

Another type of fabric body is the Childs, shown in Fig. 3. The original body of this type was exhibited in 1923 and the same body was shown at the four following automobile shows. Meanwhile the body has been given about 50,000 miles of road service and still is in good condition.

Differing from the Weymann type construction, in the Childs body the frame members are mortised and glued together in the conventional manner. It is somewhat lighter, however, than a composite body frame.

The section through *A-A* shows the method of covering the door jambs and window reveals. It has always been a difficult job to form the leather cloth around the corners such as are shown here without breaking it. In this design a separate reveal is employed, the material is simply carried back so that the reveal will cover its edge, the reveal covering is then blind tacked and the wood reveal, consisting of a continuous piece of wood is fastened in place with screws and the fabric formed over it and tacked as illustrated. This also permits using a different colored material around the window openings.

Steelcrete Metal Mesh

At the left of Fig. 3 is shown a section of Steelcrete, a metal mesh which is set 3/16 in. below the frame and can be rabbetted in the frame or the ends can be turned up as shown in section *B-B* and fastened with a wood cleat. It will be noted in this sectional view that the wood frame is tapered slightly toward the inner edge and the corners are well rounded. This is to provide for the cotton wadding which is laid over the mesh as a pad lapping over on the pillar or framing to prevent the frame edge showing through the covering material. Over the wadding a thin muslin cloth is stretched and the outer covering of leather cloth is tacked tightly over this.

The latest practice in putting moldings on this type of body has been to use aluminum and fasten them with nails just as applied moldings are put on composite bodies and then lacquered.

The original Childs type bodies had deck material of one piece and the quarter panels were stitched with a small pipe. At present the deck is formed with a continuous center panel from the front down to the back molding. The top and side quarter panels are joined under a lead-filled molding that is covered with the material and there is a small groove in the wood just deep enough to seat the molding as shown at *C*, Fig. 3.

Fig. 4 illustrates the original Springfield body, a collapsible and convertible body brought out by Hinsdale Smith in 1911 at a time when the phaeton was the most popular type. The Smith design comprised a light weight closed body and an open body in one. About two years later an improved design such as is illustrated in Fig. 5 was developed. The patent rights on this body passed into the hands of manufacturers in 1916 and plans were made to produce it in numbers. Financial difficulties brought about the discontinuance of this body type but it left the idea of clear vision as something to be desired in closed bodies.

In the body shown in Fig. 4 it will be noted that the general appearance of the top structure, especially when folded down, is similar to the English cabriolet. There are several original features incorporated in this design which are shown in the detail sectional views.

At *A* and *A* are shown the two positions of the throw-over brace whereby the top is made to have less overhang than it would have otherwise. The glass frames are shown in broken lines. Originally these frames were made of wood but later metal frames were employed. There were four frames to each side and they were disposed of, with the top down, by turning on the doors down inside where they were covered and protected by a flap covered with trim material. The quarter frames were lifted out and stored in a pocket.

At *C* and *D* are shown details of the hinge and method of fastening. In *C* the view is from the inside of the door and frame while *D* is looking at the same place from the side of the door jamb. The hinge apparently is composed of three parts but the member to the left is a spring arm for holding the hinge proper in open and closed positions by means of a wedge that is held in position by the coil spring bearing against the arm.

E shows three views of this spring arm and the section through *F-F* shows a detailed view at the point of connection. The top of the glass frame rested against a rubber block attached to the angle iron top rail as shown in section *G-G*. A screw adjustment in the upper part of the hinge provided means of changing the tension of the top.

The section through *H-H* shows the bottom of the door glass frame and the means provided to keep it noiseless and watertight. This consisted of a half round iron strip ½ in. wide that was fastened along the top edge of the doors and body. Along the lower edge of the glass frame was a rubber strip made to fit over this iron strip. This same arrangement was used for the quarter glass frames.

Section *I-I* shows the channel pocket formed by an angle fastened to the top rail, there being two of these pockets for each quarter window. Within the pockets were flat springs which pressed the frames down tight to the body rail. To take the quarter frames out or replace them the top of the frame was pressed against the spring which would compress enough to permit the lower end with the rubber to pass over the half-round strip and then the spring would hold the frame down in close contact. These quarter frames were stored in a pocket back of the front seat when not in use.

A Later Springfield Body

Fig. 5 shows a later type Springfield convertible body brought out by the same firm about two years ago. This body had a permanent roof which was first made of aluminum but was later made of steel. When made of aluminum it was seamed in the center and welded, making what may have been the first successful attempt at welding aluminum. The convertible feature of this body consisted in taking out the two side pillars shown in broken lines, the sides then becoming entirely open between the rear quarter and the windshield.

Of the three windows, the first two were door windows and were dropped into door wells. The quarter windows were sometimes made to drop as far as they would go to the top of the wheelhouse and in other models they were removed and placed in pockets located under the rear seat.

Various types of fasteners were employed to secure the pillars in place.

In the pillar fastener illustrations *A* and *B*, are shown the hinge parts used at the bottom of the pillars. The slot in the circular end of part *A* enabled the two pieces to be coupled together by means of the flattened pin shown in dotted lines in *B*. The pillar, with the part *A* attached, was turned down until the slot passed the flat part of the pin, the pillar was then straightened up and the top fastened. This latter connection was performed as shown in section *H-H*, the details of construction being shown in *C, D, E* and *F*.

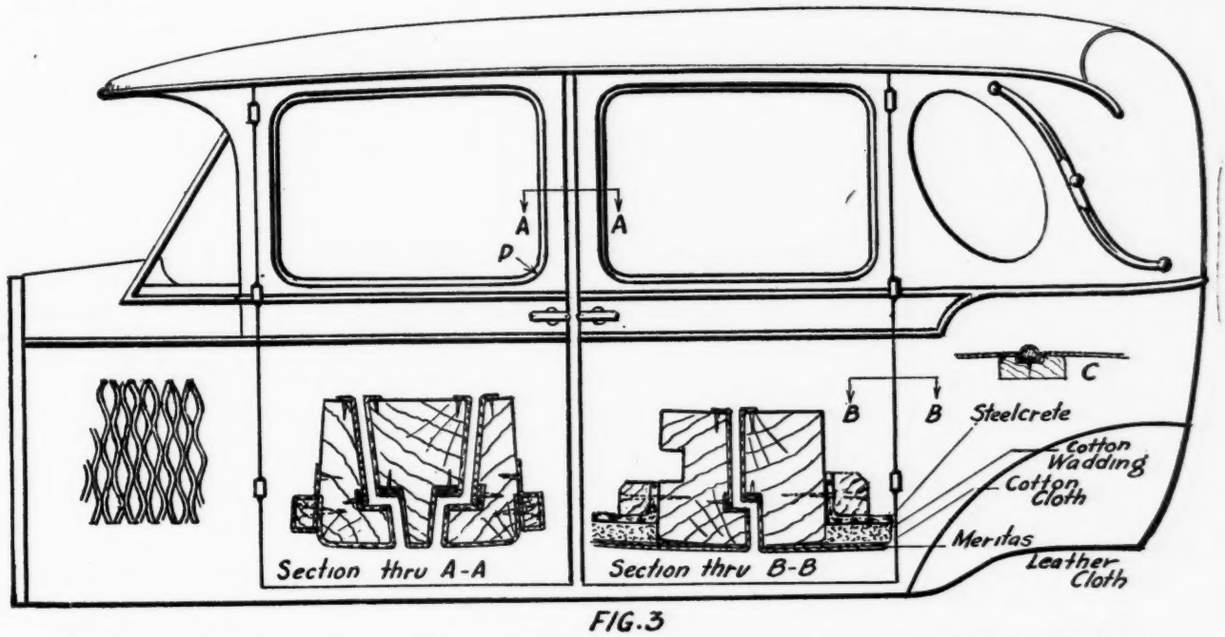


FIG. 3

Another type of fabric body, the Childs. In this design the frame members are mortised and glued together in the conventional manner

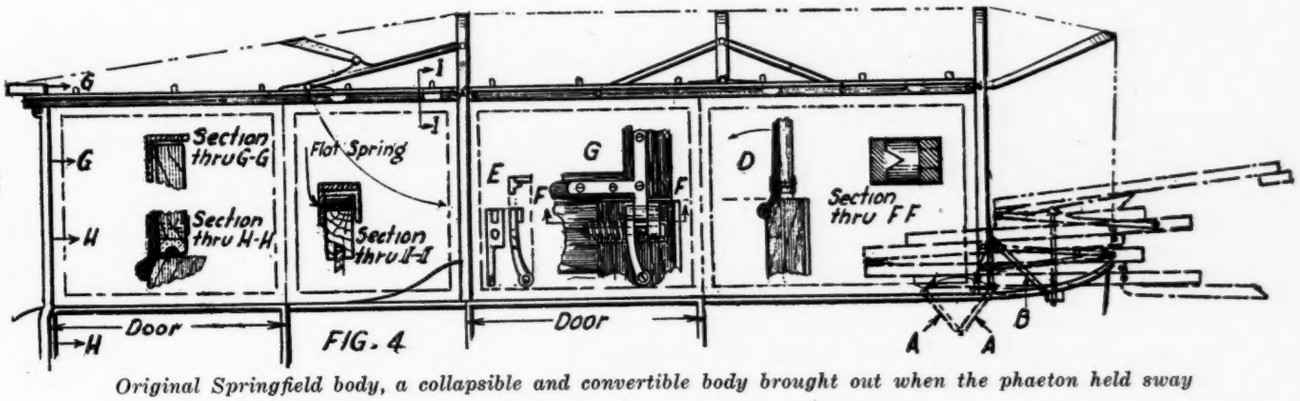


FIG. 4

Original Springfield body, a collapsible and convertible body brought out when the phaeton held sway

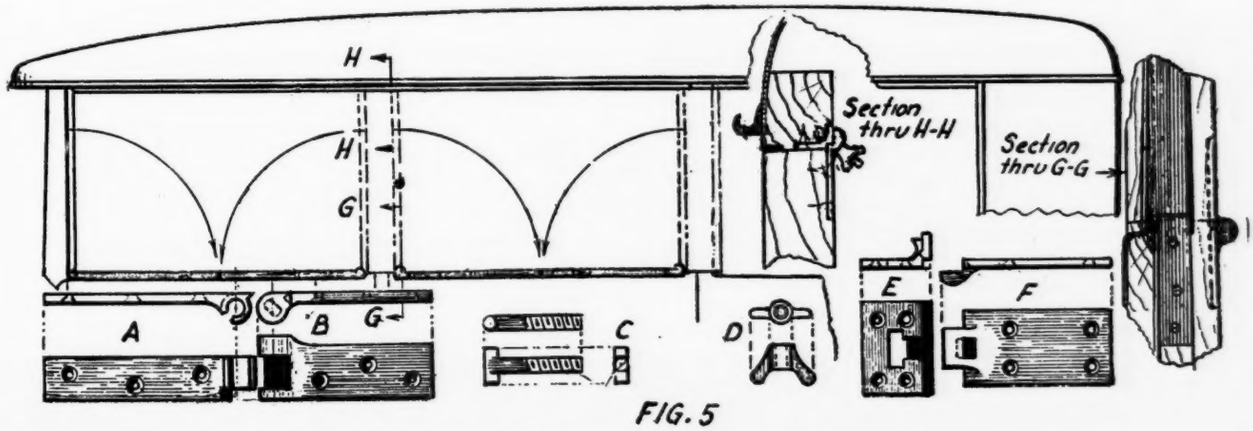


FIG. 5

A later type Springfield convertible body brought out about two years ago. The roof is steel

Just Among Ourselves

Books the Educated Man Should Read

J. H. HUNT, president of the S. A. E., sent us an unusually interesting list of books the other day. The list was compiled, at Mr. Hunt's request, by the heads of the various departments of Antioch College. Mr. Hunt had asked President Morgan of Antioch to give him "a list of books which would cover subjects on which an educated man would feel the need of information." Coming from this particular college the selections have a special significance to automotive and industrial men, for Antioch, as most automotive men know, attempts to combine in six years a liberal college education, vocational training and apprenticeship to practical life. It has had the active support of no less automotive luminary than C. F. Kettering as well as the interest of a number of other automotive executives from time to time . . . But about the list itself . . .

* * *

11 Subjects Covered in 100 Volumes

TO begin with, it includes about 100 volumes ranged under the general heads of Aesthetics, Biology, Chemistry, Economics, Finance & Accounting, Geology, Mathematics, Medicine, Physics, Psychology and Social Science. Our first criticism of the list was its failure to include a section of philosophy, which in many ways may be considered the most fundamental of all topics, but we learned later that this omission was due to the failure of a particular department to provide its section of the list and not to any oversight or lack of appreciation of the subject. It disappointed us a little to learn this to be the fact as we had some things to say about philosophy that we wanted very much to publish in the way of criticism for its omission from the list; but now these must remain locked forever in our typewriter—much to the relief of our readers without any doubt.

* * *

Ain't Been Nowhere; Ain't Seen Nothin'

BUT we might as well admit publicly, as we did in a letter to Mr. Hunt, that, looking at the list from a personal standpoint, it convinced us "We ain't been nowhere and we ain't seen nothin'." Out of the 100 volumes suggested as "covering subjects on which an educated man would feel the need of information," we find that we have read 18 and know enough about six more to have had them on our immediate prospect list. We will be glad to send a copy of the list to anybody else who would like to see how he rates up as a general reader when compared to the Antioch suggestions. Even those who have read rather widely in a variety of fields, of course, may not score very highly because they may have read considerably in a given field without having happened upon just the books chosen. As a guide for those desiring to delve further into various lines, however—and that, after all, is the purpose of the bibliography—the Antioch list seems to us to be quite useful and valuable.

* * *

Reading for Information and for Inspiration

THERE is this about all such lists, though; they always seem to us to lay a bit too much stress on the information-seeking side of general reading and perhaps not enough on the type of book which suggests, stimulates or inspires. After all, reading for straight information usually requires more will power than the average man possesses when that reading is to be done in fields other than those in which he has a direct business or a vocational interest. Thus we are pleased with the inclusion of "Microbe Hunters" and "The Life of Pasteur" in the Medicine list. Our job once forced us to read with minute care both volumes of Kester's "Accounting Theory and Practice," which is included in the list, but we can't imagine having done the job simply in quest of information about an unfamiliar field—and the books are simple and elementary in character at that. Too much attempt to systematize one's reading, we believe, makes it work instead of stimulus; or perhaps even a pose instead of an honest, quiet pleasure. Sufficient work in reading, on the other hand, to bring the mind enough background to appreciate and enjoy really stimulating material probably is necessary either in earlier or later life, if the best ever is to be gotten out of books. Anyhow, the Antioch list is mighty interesting.

* * *

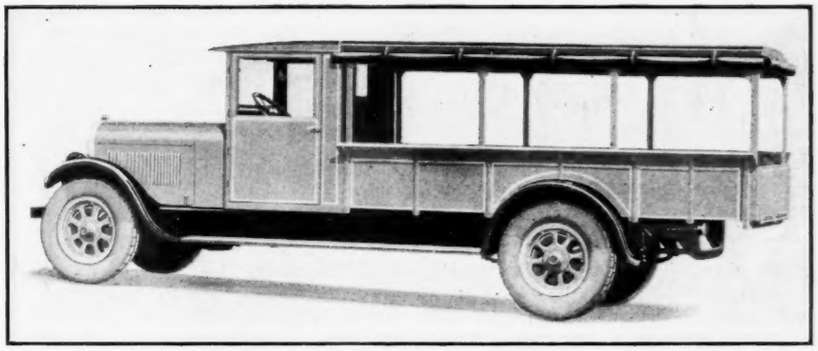
Ship-to-Shore Airplane Service

A NEW field for aviators and airplane builders was opened up the other day with Clarence D. Chamberlin's take-off from the deck of the steamship Leviathan, 100 miles out at sea from New York. As soon as possible all vessels of the United States lines will be equipped with special take-off ramps and will carry planes and aviators for the transportation of mail and passengers in a regular ship-to-shore air service. In a short time all large vessels will be similarly equipped.—N.G.S.

Reo *Speed Wagon* Line *to* Consist *of* Five *Chassis* Models

Company getting into production on 1-ton, 2-ton and 3-ton models in addition to the Junior and 1½-ton models previously described. New bus also coming.

REO'S complete new line of Speed Wagons is gradually getting into production. The line will consist of five distinct chassis models. Two of these, the Junior Speed Wagon, with a six-cylinder special Continental engine, and the 1½-ton model with a chassis listing at $1,345, have already been briefly described. (See issue of July 2.) In addition there will be a 12-passenger bus chassis edition of the 1½-ton model, this having a wheelbase of 143 in. and listing at $1,445; a 1-ton model which has not as yet reached the production stage; a 2-ton 148-in. wheelbase model with chassis listing at $1,645, and a 159-in. wheelbase 3-ton truck chassis listing at $2,185.



Reo's new 2-ton truck with express body

In bringing out the new line of Speed Wagons the governing idea in the design was to furnish truck operators with vehicles which were capable of maintaining higher road speeds in conformity with increased passenger car speeds on highways. To this end, frames have been lowered as far as possible, governors have been eliminated, four-wheel brakes have been included as standard equipment on all except the heavy duty 3-ton model, and power transmission has been designed for higher speeds.

T-6, F-Head Engine

Engines in all models except the Junior are practically identical with the Reo T-6, F-head engine formerly used, and are all six-cylinder. In contrast to former Speed Wagon design, however, transmission and engine are assembled in unit. Three-speed transmissions are used on all except the 3-ton model which has a four-speed direct on fourth unit. Twelve-inch single plate Brown-Lipe clutches are used on all except the Junior, and these models are furnished with bevel gear rear axles, 1½ and 2-ton model axles being semi-floating and the 3-ton having a full-floating axle, all manufactured by Reo. Gear reduction on the 2-ton model is 6.5 to 1, on the 3-ton 6.22 to 1 on high and 23.26 to 1 on third.

Brakes on the 1½ and 2-ton chassis are of the internal expanding mechanically operated type, with 14½-in. drums, the front drums being 2 in. wide, with a 3-in. drum width on the rear wheels. Brakes on the 3-ton model are dual internal expanding on the rear wheels, drums being 16½ in. in diameter, with a width of 3 in. on the service, and 2¼ in. on the emergency brake lining. Emergency brakes on the 1½ and 2-ton models are located on the propeller shaft, with 9-in. drums, 3½ in. wide.

Front axles are of I-beam design, manufactured by Reo. Steering gears are also of Reo manufacture and of the bevel pinion and sector type. Two-unit North East electrical equipment is standard on all models. A Schebler carburetor is part of the fuel system. Chassis lubrication is by Myers magazine oilers. Springs are semi-elliptic throughout, with the following dimensions:

	Front	Rear
1½-ton	38½ by 2	50 by 2½
2-ton	38 by 2	50 by 2½
3-ton	38 by 2¼	50 by 3

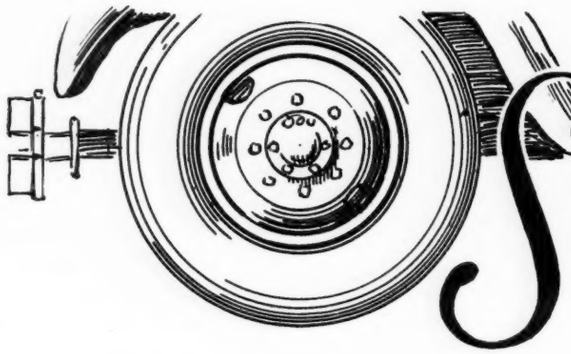
Following also are chassis dimensions on the various models:

	Total length	Overall width	Dash to rear of frame	Width of frame
1½-ton	195 5/16 in.	68 in.	145½ in.	40½ in.
2-ton	211 5/16 in.	68 in.	160½ in.	40½ in.
3-ton	226 17/32 in.	82⅝ in.	176 17/32 in.	40½ in.

Stake bodies will be offered on all three of these chassis. In addition, an express type body with short canopy and inclosed cab is offered on the 1½ and 2-ton models and an open cab full length canopy on the 1½-ton chassis. The 143-in. bus chassis, which is identical except for length with the 1½-ton model, will be marketed without bodies.

Tiltray Headlights

Tires on the 1½-ton model are 32 x 6 in. pneumatics on malleable iron wheels. Tires on the 2-ton model are also 32 x 6 in. front, with 34 x 7 in. on the rear, on the same type wheels. Dual 32 x 6 in. tires are furnished on artillery type rear wheels on the 3-ton model, this chassis also having single 32 x 6 in. tires at the front. Tiltray double-filament headlights are standard on all models, with the light control on the steering wheel.



Six-Wheel

Many Vehicles of This Type Now in Production—State Laws Have Sped Development

LEGISLATION in some of the states allowing higher weight limits for six-wheeled than for four-wheeled vehicles has greatly increased interest in the former type. The six-wheel movement started in the United States in 1918 when the Goodyear Tire & Rubber Co. of Akron, Ohio, engaged in development work with the object of making pneumatic tires available for heavy vehicles. When getting up to the 12-in. size the Goodyear company realized that it had reached and even passed the practical limit, because of the great difficulties encountered in replacing tires of this enormous size on the road in the event of a puncture or blow-out. It then began its experiments with a six-wheeled chassis and dropped the 12-in. tire.

The six-wheel movement received a strong impetus some years ago when the State of California adopted weight limits and differentiated between four and six-wheeled vehicles, setting the limit on four-wheelers rather low, corresponding approximately to the loaded weight of a 5-ton truck. Other states have since followed the California example and in 16 of them it is now legal to carry greater weights on the three axles of the conventional six-wheeled vehicle than on the two axles of a four-wheeler. The states and the limits are given in the tabulation:

WEIGHT LIMITS ON MOTOR VEHICLES

	Per In. Width of Tires	Per Axle	Four-Wheeled Vehicles	Six-Wheeled Vehicles
Arizona	800	22,400	28,000	*
California	700	18,000	22,000	34,000
Colorado	700	.....	28,000	*
Florida	600	16,000 8,000†	.....	*
Illinois	800	16,000	24,000	40,000
Indiana	800	22,400	.....	*
Louisiana	600	15,000	.....	*
Maine	700	13,500	18,000	27,000
Missouri	600	16,000	24,000	38,000
Nebraska	600	14,000	.....	*
Ohio	650	16,000	20,000	36,000
Pennsylvania	800	19,500	26,000	39,000
Rhode Island	800	22,400	28,000	40,000
South Carolina	600	15,000	20,000	*
Tennessee	650	12,000	20,000	*
Washington	600	11,000	24,000	27,500

* Six-wheeled vehicles can exceed the weight limit for four-wheeled vehicles provided the weight limit per inch of tire width and per axle is not exceeded.
† For solid tires.

Several other states allow greater weights to be carried on six than on four wheels but only under the condition that the distance between axles be at least equal to a certain minimum which is far greater than that between the two driving axles of the conventional six-wheel wheeler. These laws evidently were passed to fit the case of the tractor and semi-trailer combination.

The reason for placing a limit on total vehicle weight or on the weight per axle is that it is desired to prevent injury to the roads from too great concentration of load. All other things being equal, the shock imparted to the road by a vehicle wheel when passing over an obstacle or dropping into a depression depends upon the weight on the wheel, from which it follows directly that the individual shock must be much less in the case of a six-wheeled vehicle than in that of a four-wheeled vehicle carrying about the same load. This theoretical conclusion has been confirmed, moreover, by tests of the U. S. Bureau of Public Roads, in which direct measurements were made of the shock imparted to the road surface.

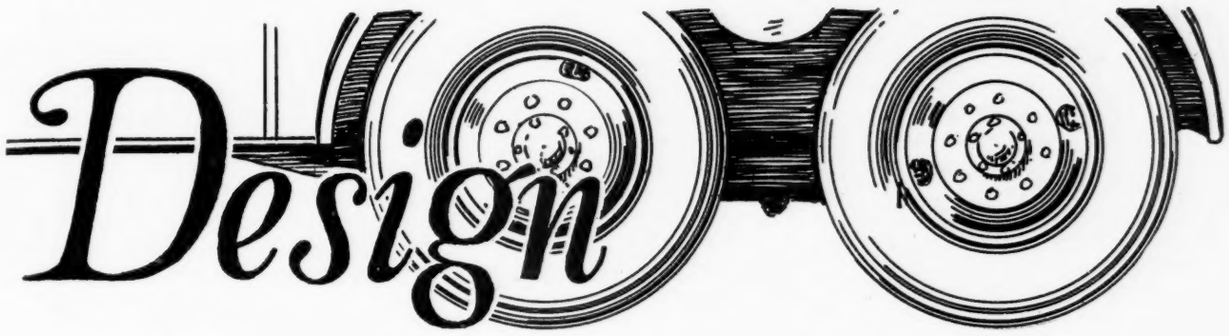
Distribution of Stress

The distribution of pressure or stress in the ground under one rear wheel of a four-wheel truck and the two rear wheels of a six-wheeled one is shown in Fig. 1. Dealing with this subject of the impact stresses produced by the wheels of four and six-wheeled vehicles, James A. Buchanan of the U. S. Bureau of Public Roads, in a paper on "Impact Forces Exerted by the Motor Truck on the Highway," read at the sixth annual meeting of the Highway Research Board, held in Washington, D. C., in 1926, said:

"The unsprung components of the impact reactions of a six-wheel truck are shown to be one-half of the corresponding reactions of a four-wheel truck which differed only in the rear axle arrangement, the total loads being the same on each truck. This fact is substantiated by tests conducted to determine the relative effect of four and six-wheel trucks on a pavement slab. The fiber deformations produced in a 6-in. concrete slab were twice as great by a four-wheel truck as they were by a six-wheel truck carrying on two rear axles the same load carried by the single rear axle of the four-wheel truck."

It has been held by some that where the wheels are as close together as in the conventional six-wheeled vehicle, on a rigid road surface such as that of a concrete-paved road, the stresses from the two wheels on the same side overlap, so that there is no appreciable reduction in the road stresses as a result of the division of the rear load between two axles, and no increase in the weight limit should be made in favor of such vehicles. This assertion, however, is not borne out by the tests of the Bureau of Public Roads. The rear wheels of the six-wheeled truck with which the above quoted results were obtained were moved apart stepwise, the deflection of a 6-in. concrete road slab being measured for each spacing. There was a slight decrease in the deformation of the slab as the spacing was increased from 36 to 40 in. but no further decrease as the spacing was increased in seven further steps to 118

Design



By P. M. Heldt

in. From this it would follow that any increase in the spacing of the driving wheels beyond the usual 40 or 44 in. would be of no advantage so far as road preservation is concerned.

From the above it is plain why state highway departments, in their efforts to protect their state's investment in roads, should favor the six-wheeled construction for heavy vehicles and should be willing to permit much higher load limits on six-wheeled than on four-wheeled vehicles. Although at the present time only a third of the states make a distinction between the two classes, it is to be foreseen that within the next few years many of the other states may pass similar legislation. Propaganda to have the road laws changed is being carried on in many of these states. The writer has before him, for example, a memorandum covering proposed amendments in a particular state in which the findings of the Bureau of Public Roads in respect to the relative road impacts of four and six-wheeled vehicles are cited and amendments to the laws of the state are suggested which would allow a higher weight limit for six-wheeled vehicles.

What is the most logical proportion between weight limits for four and six-wheeled vehicles is not so easily settled. At first thought it would seem that if 20,000 lb. were a proper limit for four-wheeled vehicles, 30,000 lb. would be a proper limit for six-wheeled ones, because it should be possible to carry 50 per cent more load on three axles than on two, or on six wheels than on four. But the problem is not as simple as that. The reason for this is that the load is not evenly divided between the axles.

In the average commercial vehicle carrying a full load evenly distributed over its loading space, the proportion

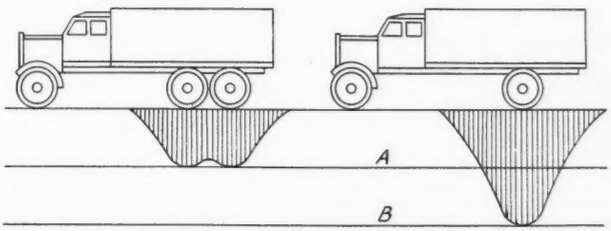


Fig. 1—Distribution of ground pressure under impact from six and four-wheeled vehicles

is about 30 per cent of the total weight on the front axle to 70 per cent on the rear axle. Now, as regards injury to the road, that caused by the front wheels of such a vehicle is small compared with that done by the rear wheels. If the truck were provided with two axles at the rear the load per rear axle would be halved, and since the load on the front axle was less than half that on the rear axle in the first place, it would be possible to double the weight of the truck with load without exceeding the maximum weight per axle in the four-wheel truck. However, in that case each of the three axles would carry a load nearly equal to that of the single rear axle in the case of the four-wheel truck, and the potentiality of a six-wheeled truck of twice the total weight for doing damage to the road would evidently be greater than that of a four-wheeled truck. Hence it would seem logical to place the weight limit for six-wheeled vehicles at somewhere between 150 and 200 per cent of the limit for four-wheeled vehicles.

Two Fundamental Advantages

The two fundamental advantages of six-wheeled construction may thus be said to be that it permits of the use of pneumatic tires being extended to higher weight limits and of reducing the wear and tear on roads of vehicles of given total or laden weight. There are, however, a number of additional advantages. In modern buses, riding qualities are an important factor and it is evident that—everything else being the same—the shock produced by one of the wheels striking a road obstacle of a certain magnitude is dampened out before reaching the passenger, much more in a six-wheeled than in a four-wheeled vehicle. In a bicycle, in which the rider sits directly over the rear wheel, he experiences the full force of such a shock when that wheel passes over an obstacle. In a four-wheeled vehicle in which the passenger sits midway between axles the frame forms a simple lever which reduces a shock in the ratio of 2 to 1, and there is a further reduction when only a single wheel passes over an obstacle at a time, due to the axle acting as a simple lever around the point of ground contact of the other wheel. In a six-wheeled vehicle the shock is further halved by the action of the spring connecting corresponding ends of the two rear axles, acting as a simple lever with a 2 to 1 ratio. Of course, the frequency of shocks is increased, but this does not nullify the advantage gained, for if we could continue to increase the frequency of shocks and at the same time proportionately decrease their magnitude we would gradually approach an ideal condition.

It is also claimed for six-wheeled vehicles that they afford greater freedom from skidding tendencies. This may be explained on two grounds: In the first place, the combined weight on the four wheels of a six-wheeler will be slightly greater on the average than the weight on the two rear wheels of a four-wheeler of equal total weight, hence the aggregate adherence of the rear wheels—to which the brakes are applied—will be greater in the case of the six-wheeler and it will be somewhat more difficult to lock all of them by the brakes; and it is such locking of the rear wheels by means of the brakes on slippery roads which is the principal cause of skidding. Besides, owing to differ-

ences in the linkage, of friction surfaces or of road contact surfaces, it is probably more difficult to lock four wheels than two wheels at the same time, and as long as only one wheel continues to rotate the vehicle is safe.

The six-wheel movement, which, as explained above, originated here, has not remained confined to this country, but has gained considerable momentum in Europe, particularly in England. In the latter country the movement has received a great impetus through the recent decision of the War Department to pay subsidies to owners of six-wheeled vehicles meeting certain specifications. A suitable design has been worked out and patented by the engineering staff of the War Department, and this design is offered to manufacturers who aspire to have their vehicles "certificated" for the War Office bonus. This design was fully described in a paper recently read before the Institution of Mechanical Engineers by Captain C. H. Kuhne.

Why Six-Wheeler Was Adopted

In outlining the events which led up to the adoption of the six-wheeler, Captain Kuhne said that of the 80,000 mechanical transport vehicles which the British Expeditionary Force had in use in France and Belgium at the end of the war, most were 3-4 ton trucks on solid rubber tires, which type had been encouraged by the pre-war subsidy scheme. It was an economical and reliable performer on good roads, but owing to its great axle weight (5½ tons on the rear axle) and its low torque/weight ratio it was a very poor machine for negotiating rough and soft grounds, and its ability to move off the road was negligible. Vehicles with a lighter axle weight, higher torque/weight ratio and shod with pneumatic tires, such as the Fiat light truck and the Ford truck, could be used with a fair measure of success.

After the war it was decided to motorize the Supply, Baggage and Ammunition Transport, and it was realized that this called for a type of vehicle with greater power on bad ground. This led first to the design of a 30 cwt. truck, in which it was endeavored to incorporate the necessary qualities by the use of only high grade material, eliminating all unessential weight, and using wire wheels and pneumatic tires.

Subsequent developments in aircraft, high-speed tanks, gun tractors, etc., made it increasingly necessary that the general mechanical transport service of the army should have still greater mobility and the power to move anywhere off the made road. The solution of the problem lay in the provision of a greater area of contact with the ground per unit of load carried, and it was decided that what in Great Britain is now known as the rigid-frame six-wheeler (to distinguish it from a tractor with semi-trailer) designed to drive at least two axles, would best meet the requirement. In December, 1926, various British Government Departments had received delivery of 120 of the new six-wheelers and had 150 more on order.

The first manufacturer in France to take up the six-wheeler was Renault, who built a light truck chassis of this type in 1923. This machine was designed to carry a load of 1½ tons over the sandy trails of the French African colonies and was of unusually light weight, the chassis alone weighing a little over 2600 lb. Each of the six wheels was fitted with dual pneumatic tires and the total load, therefore, was divided between twelve tires. A sample machine of this design was acquired for tests by the British army and trials made with it convinced the latter that the rigid-six-wheeler was the type of machine for army service. Another French maker, Berliet, recently also brought out a six-wheeled truck for colonial service.

One of the first questions that arise in connection with a six-wheeled lay-out is that of the steering action. It is a fundamental principle of steering that, in order that there may be no side-slipping of any of the wheels when the vehicle is describing a curve, the axes of all wheels produced must pass through a single vertical line, this being the axis around which the vehicle turns. With a rigid six-wheeler this is evidently impossible, since the two rear axles are parallel with each other and the axes of the four rear wheels therefore never meet. This is shown in Fig. 2. In order to make the deviation as small as possible; or, in other words, to make the axes of all of the road wheels approach a given vertical line as closely as may be, the rear axles are placed as close together as is practical.

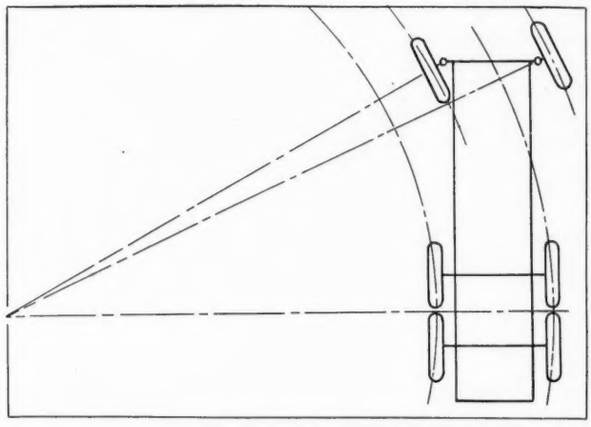


Fig. 2—Steering diagram of a six-wheeler

This imperfection in the steering action is, however, much less serious than that in the case of a vehicle with dual rear tires (which have long been successfully used.) With the latter arrangement the two tires on the same wheel describe arcs of circles whose radii differ by the distance between their tread centers. In the case of 6 in. tires this amounts to about 7 in. Therefore, in making a complete turn, if one wheel did not slip, the other would have to slip a distince of

$$2 \times 3.14 \times 7 = 44 \text{ in.}$$

If both slipped equally, each would have to slip 22 in., which is equivalent to 5.5 in. for a quarter circle or 90 degree turn. On the other hand, in a six-wheeled vehicle, if the distance between the two rear axle centers is 44 in., the distance between the center line between rear axles and the front axle is 176 in., and the maximum deflection from the straight ahead position of the inner front wheel is 40 deg., the true radius of the track of the inner rear wheels will be

$$\frac{176}{\tan. 40 \text{ deg.}} = \frac{176}{0.839} = 207.5 \text{ in.}$$

But the distance from the center of the track to the center point of rear wheel-ground contact will be

$$\sqrt{207.5^2 + 22^2} = 208.66 \text{ in.}$$

or 1.16 in. more than the true turning radius. Hence, in describing a complete circle each wheel must slip

$$2 \times 3.14 \times 1.16 = 7.3 \text{ in.,}$$

and in describing a quarter circle,

$$7.\tfrac{3}{4} = 1.82 \text{ in.,}$$

as compared with 5.5 in. in the case of dual tires considered previously.

With a six-wheeler of this type the actual turning

axis is the vertical line through the point of intersection of the axes of the two front wheels with a line midway between the axes of the two rear axles, as careful measurements of the British War Department have shown. If a complete quarter turn is made there is, undoubtedly, some side-slipping of the rear wheels. Lateral flexibility of the pneumatic tires has a favorable effect in this respect. Straight side tires have more lateral flexibility than the clincher type, and the flexibility increases as the air pressure decreases. When describing arcs of small angular measure the imperfection in the steering diagram is undoubtedly completely compensated for by the flexibility of the tires, and experience has shown that as long as the ratio of the distance from the front axle to a line midway between the axes of the driving axles, to the distance between driving axles is at least three, there is no trouble from the imperfection of the steering diagram.

Arrangement of Rear Springs

Another problem is that of the arrangement of the chassis springs at the rear. This obviously must be such that it is impossible for the whole of the weight at the rear of the chassis to come on a single spring and a single wheel and tire. In fact, the arrangement should preferably be such that under all conditions of road surface the load will be fairly evenly divided between all four wheels. The ordinary method of using a semi-elliptic spring at each end of each axle is therefore impractical. It is usual to employ inverted semi-elliptic springs which have a swiveling connection with the chassis at their middle and are connected—either rigidly or flexibly—to one of the axles at each end.

In a propaganda sheet antagonistic to six-wheelers which has been circulated in England recently the point is made that on account of the necessary proximity of the two rear axles, the length of the rear springs is limited to about 44 in., where in buses in which this limitation does not exist, rear springs 60 in. long are used, the inference being that the riding qualities of the six-wheeler cannot be so good. Now, in the first place, it has been pointed out already that, the vertical movement of the frame being halved when one wheel of a six-wheeler passes over an obstacle, the riding qualities of such a vehicle are naturally considerably better than those of an otherwise equivalent four-wheeler. On the other hand, riding qualities are not a function of the length of the springs but of the volume of spring material. If the length of the springs is limited for any reason, it is possible to obtain the same spring action by making the leaves wider, thinner and more numerous so as to obtain the same flexibility characteristics.

Quite a variety of final drives have been used for six-wheeled vehicles. The most popular at the present time is the worm drive, which has the advantage that, since the worm shaft is located either above or below the axle, it can be continued straight on to the rear one of the two axles and therefore gives a comparatively simple construction. A short intermediary shaft and two universals must be inserted between the two worm shafts to allow for relative motion of the two axle housings.

Bevel gear drive was used in the original Renault six-wheeler (Fig. 3). The propeller shaft from the transmission connects through a universal joint to a shaft extending through the upper part of the central housing of the forward driving shaft and through the housing, integral therewith, of a two-speed gear back of this central housing. What corresponds to the secondary shaft of this two-speed gear carries a bevel pinion at its forward end, meshing with the ring gear of the forward driving axle, and connects through a shaft with two universal joints to the bevel pinion shaft of the rear driving axle. The connecting shaft between the two axles is incased in a two-part concentric tubular housing which has a forked or pivotal connection with the center housing of each axle. This tubular member serves as the torque member.

There are evidently two methods of taking up the torque reaction on the housings of the driving axles. One—the simplest and that in most extensive use at the present time—consists in connecting the two axle housings by telescoping torque tubes. This construction is exemplified by the Safeway four-wheel drive of the Six-Wheel Co. of Philadelphia, which is illustrated in Fig. 4. When the axles are under driving torque, their housings tend to turn in a direction opposite to that in which the wheels turn, and by bracing the axle housings in this way, all angular movement is prevented. The other method consists in connecting each axle housing independently to the frame by means of a torque tube or torque link.

Whenever torque reaction is taken up by either of these methods there is always a transfer of weight from one pair of road wheels to another. Thus, when each of the driving axles is provided with a torque member connecting directly to the frame, weight is transferred from the front axle to the driving axles; in other words, when the vehicle is being driven, the ground pressure of the front wheels is decreased and that of the rear wheels increased. On the other hand, if the two driving axles are connected together by a torque member, weight is taken off the forward driving axle and transferred to the rearward one. The relative transfer of weight is inversely proportional to the distance between the axles between which it takes place, and the objection has been made to the method of using a torque member between axles that it interferes unduly with the distribution of axle load.

In Fig. 5 let W be the total weight of the vehicle with load; R, the wheel radius; r, the ratio (distance between rear axle centers) /(wheel diameters); p, the fraction of total weight on the driving axles; f, the traction coefficient or the proportion (total weight)/(traction force); and μ the coefficient of friction or coefficient of adherence between tire and ground.

Without any torque applied to the wheels the load on each rear axle is them $Wp/2$, but the driving torque transfers a weight $xWp/2$ from the forward to the rear axle so that the load remaining on the forward axle is only $(1-x)(Wp/2)$. Assuming all of the driving wheels to be of exactly the same diameter, there is a driving force $Wf/2$ at the circumference of each pair of drive wheels. The moment of the weight transferred into the

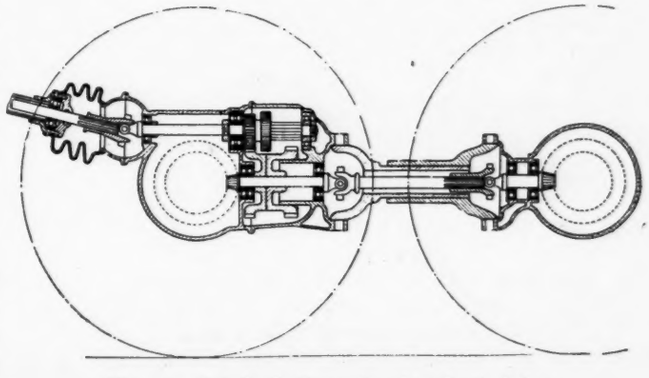


Fig. 3—Original Renault six-wheel drive

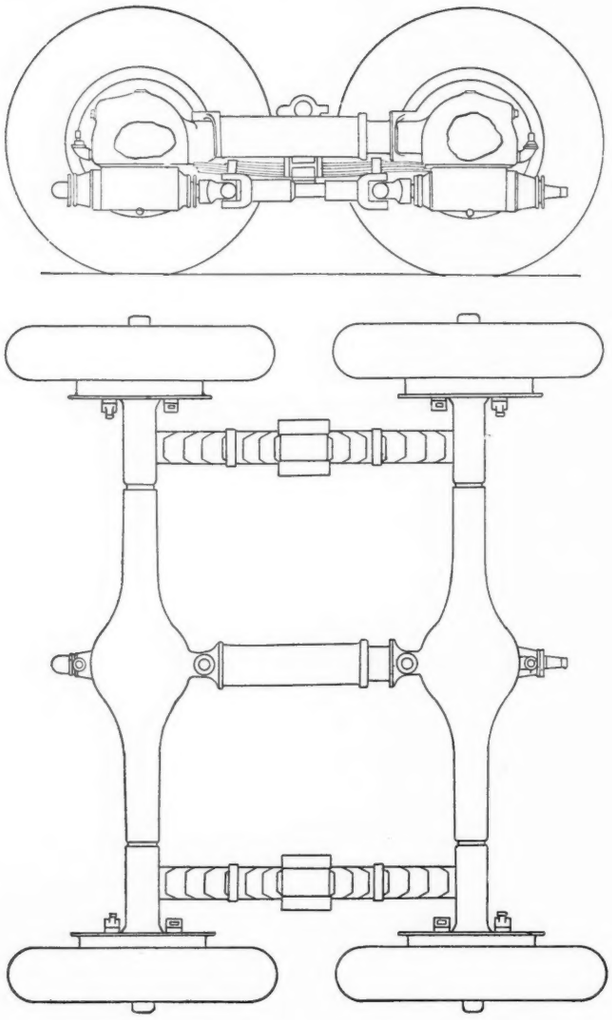


Fig. 4.—Four-wheel drive of Six-wheel Co., showing method of taking up torque reaction on telescoping torque members between axles

distance between axles is equal to the moment of the total traction force into the wheel radius, that is,

$$(xWp/2\ (2rR) = WfR,$$

from which it follows that

$$x = f/pr$$

and

$$1 - x = 1 - (f/pr)$$

Substituting this value of x in the expression for the weight on the forward driving axle we get

$$[1 - (f/pr)\ ]\ (Wp/2),$$

and the limiting traction force which a pair of wheels carrying this load can exert without slipping is

$$[1 - (f/pr)\ ]\ (Wp/2)$$

There will be slipping when the value of this expression is smaller than the value of the traction force on one pair of wheels, viz., Wf/2; that is when

$$[1 - (f/pr)\ ]\ (Wp/2) < Wf'/2$$

or when

$$\mu < fr/\ (pr - f)$$

The ratio r of rear bogie wheelbase to wheel diameter will be about 1.25; the proportion p of the total weight which is carried by the rear axle will be about 0.7 and the maximum value of the traction coefficient will be about 0.25, which corresponds to an acceleration of

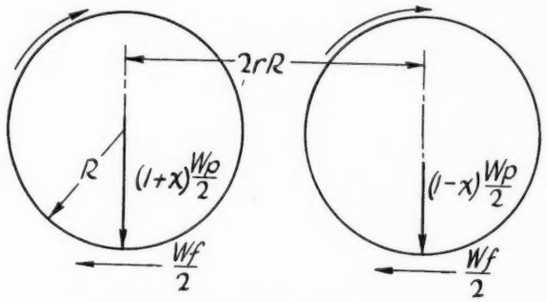


Fig. 5—Diagram showing weight transfer from one driving axle to the other when torque members extend between axle housings

about 7.5 ft. per second per per second. Hence, substituting these values, slipping would occur if

$$\mu < 0.25 \times 1.25/\ [(0.7 \times 1.25) - 0.25],$$

that is when

$$\mu < 0.5,$$

which is always the case when the roads are at all greasy.

There can be free slipping of driving wheels only if a differential is used between the two axles. In designs in which both axles are positively driven the transfer of weight from one to the other of the driving axles does not affect the limiting torque which can be transmitted. For that reason it would seem preferable to have independent torque members for both axles when a differential is used between axles, while where no such differential is used the disturbance of load distribution by the torque reaction where the axles are connected by a torque member does not seem to be of any practical consequence.

Great flexibility of what may be called the rear bogie has been aimed at in the British W. D. design of six-wheeler, no doubt in view of the contemplated use of these vehicles off the beaten highways. Duplex semi-elliptic springs are used at the rear. These are clipped at the middle of their length to a spring saddle pivoted on a bracket secured to the chassis frame, while the ends of the two springs connect to brackets which have spherical seats on the axle housings. One advantage of the dual spring construction is that there are two master leaves on which the driving thrust is taken. Owing to the spherical seats of the spring brackets on the axle housings the spring leaves are not unduly strained by any weaving of the rear bogie.

In this design the torque is taken up by two short torque rods with ball and socket joints, each of which extends from a point on top of the axle housing to a point on a frame cross member. Preferably the two torque members are offset to opposite sides of the center of the frame. How this construction enables the rear wheels of the W. D. six-wheeler to accommodate themselves to road irregularities is clearly illustrated in Fig. 6. Owing to the use of what amounts practically to parallel links between the axles and the frame, whenever the center of one axle is raised relative to the other, the two worm shafts remain parallel, and speed fluctuations of these shafts and of the parts driven from them, due to the action of the universals, are therefore avoided. However, as the difference in level between the two axles may attain 9 in., the angles between the two worm shafts and the intermediate shaft may be as large as 26 deg., and universal joints capable of operating at large angles must therefore be used.

In a 4-7 ton six-wheel truck recently put on the mar-

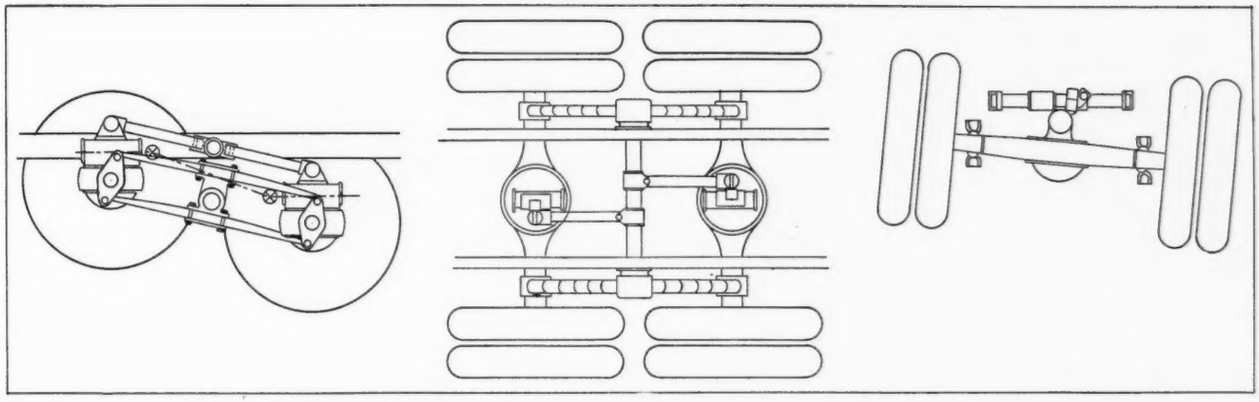


Fig. 6—Rear bogie of British War Department Six-wheel vehicle, showing its flexibility

ket by Scammell Lorries, Ltd., of Great Britain, there is only a single live rear axle, but at each end of the axle housing is mounted a gearcase, in such a manner as to be free to rotate through a considerable angle around the axle housing. Within the housing are carried two stub shafts, at equal distances from the axis of the axle, which stub shafts carry one road wheel each and a spur gear connecting through an intermediate gear to the driving pinion at the end of the axle shaft.

Torque Reaction

At first glance one would be inclined to think that in this case torque reaction would be taken up by the gear housings, but such is not the case. The point of origin of the torque reaction in this case is the thrust bearing on the worm shaft, the load on which tends to turn the shaft housing around its axis. It is prevented from turning by the semi-elliptic chassis springs which are clipped rigidly to the axle housing and pivoted to the frame at their forward end, these springs also taking the driving thrust.

An advantage claimed for the Scammell system is that the wheels are free to adapt themselves to exceedingly uneven ground surfaces. The wheels on each side, moreover, always remain in the same plane—contrary to what happens in a vehicle with two driving axles when traveling over rough country—which improves the working conditions for a non-skid band or chain track over the two wheels.

The German Buessing six-wheeler, mainly used for buses, also is designed along original lines. There is a spur pinion on the tail shaft of the transmission which meshes with spur gears on opposite sides of it and inclosed in a separate compartment of the transmission housing. From the shafts of these two spur gears extend two propeller shafts, one to each of the driving axles, which are driven by bevel gears. The propeller shafts are in two parts each, and the rear part of each shaft is surrounded by a propeller shaft tube with a spherical support at its forward end. These propeller shafts tubes take care of both the driving thrust and the torque reaction. In this case, therefore, since the torque reaction of each axle is transmitted to the frame separately, there is no disturbance of the load division between the two driving axles by the torque. The general arrangement of the drive on the Buessing is shown in Fig. 9.

The rear spring suspension of the Buessing is also unusual. There are two spring supporting bars which extend between lugs depending from the housings of the two driving axles. These bars are braced by a central and diagonal tubes. The central cross tube extends right through the spring bar and the spring

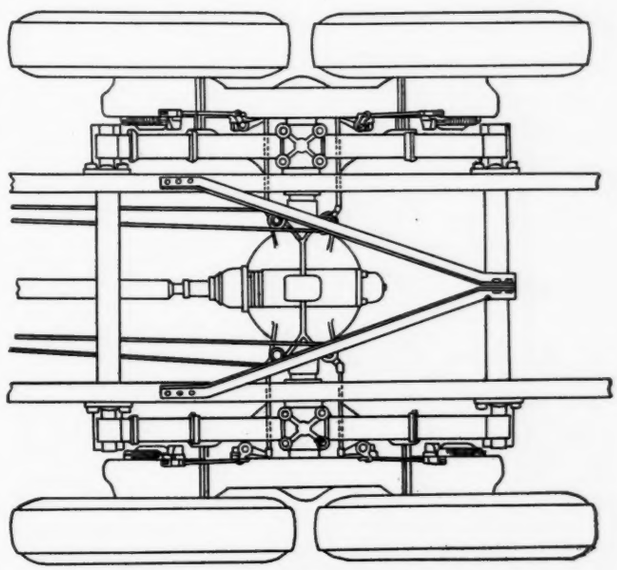


Fig. 7—Rear bogie of Scammell six-wheeled chassis with single live axle and four driving wheels

saddle is forked and straddles the bar, having bearings on the tube on opposite sides of the bar.

A sort of universal and sliding joint is used between the frame and each end of each rear spring. The end of the spring main leaf is cup-shaped and rests in a spherical socket in a shoe which is adapted to slide longitudinally in a guide fastened underneath the frame side member. A yoke-shaped guard on the guide prevents the cup of the spring leaf from leaving its socket. With this construction there is evidently automatic compensation for wear at the spring connection and all straining of bearing parts due to weaving of the axles is prevented.

Another original arrangement of the drive is found in the new colonial vehicle recently developed by the Berliet Co. in France and tried out in an expedition across the Sahara Desert. In this vehicle, as shown in Fig. 12, the power is transmitted by bevel gears to a conventional passenger car rear axle which serves as jackshaft and is located above the rearward one of the two driving rear axles. The jackshaft carries bevel pinions at both ends, which mesh with bevel gears on longitudinal shafts at both sides of the vehicle. Each of these longitudinal shafts carries a worm meshing with a worm wheel on the road wheel at its side of the rearmost axle and connects through a short intermediate shaft with two fabric type universal joints

to another worm shaft, the worm of which meshes with a worm wheel on the road wheel at its end of the forward one of the driving axles. The two axle housings are tied together by tubular links with ball and socket joints, similar in appearance to steering drag links, one above, the other below the axle, which take care of the torque reaction. The frame is supported by one inverted semi-elliptic spring on each side, located directly below the frame side member, while the longitudinal shafts connecting the two worm shafts are located outside the chassis frame. The drive on this machine seems to be somewhat complicated, as there is a triple gear transmission, two transmissions by bevel gears and one by worm and wheel. Differential action is obtained between opposite sides but not between the two driving wheels on each side.

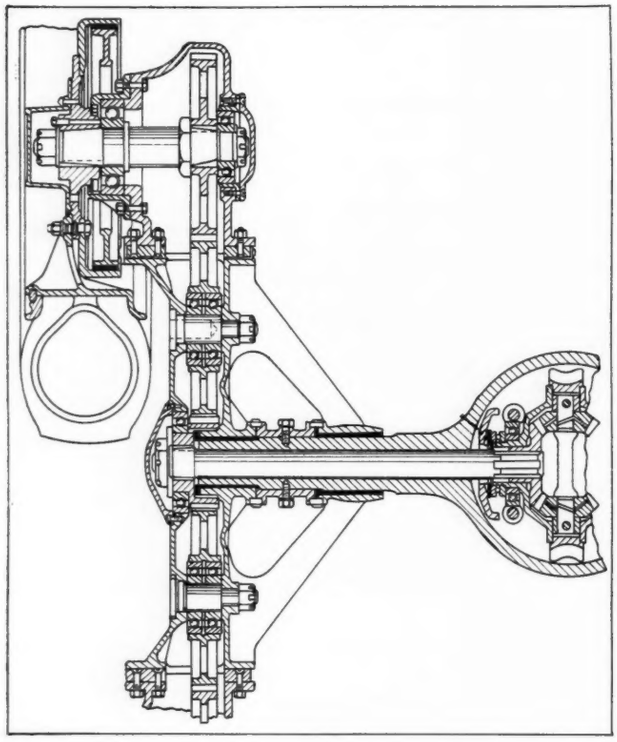


Fig. 8—Sectional View of Scammell rear axle

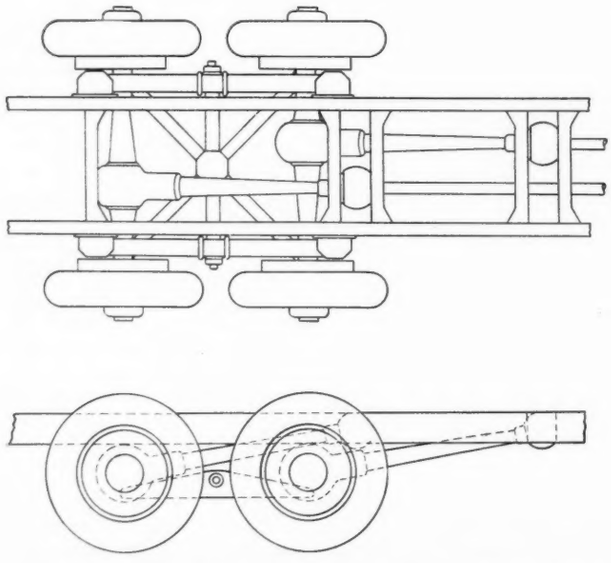


Fig. 9—Plan view and elevation of Buessing rear bogie

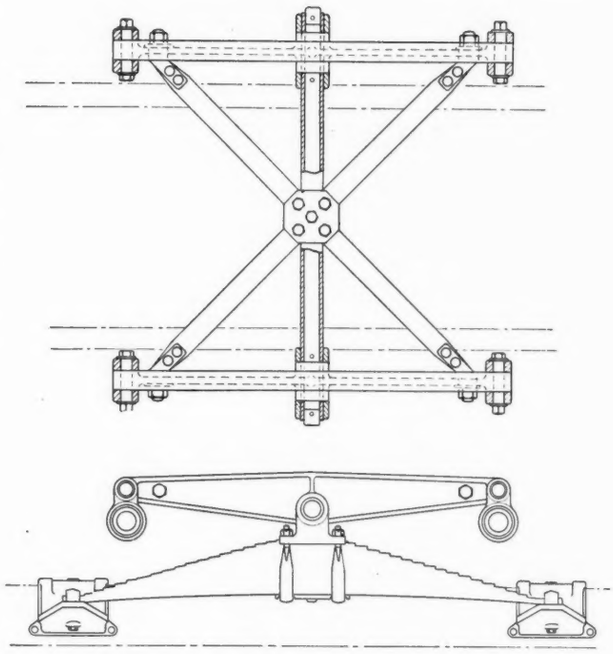


Fig. 10—Rear spring mounting of Buessing six-wheel chassis

In addition to the arrangement of six-wheel chassis dealt with in the foregoing, in which there are two driving axles close together at the rear and a steering axle in front, which may be regarded as the conventional form of six-wheeler, there are various other possible arrangements, some of which are in practical use.

Spacing the Axles

It was pointed out in the foregoing that in the conventional six-wheel chassis the two driving axles are placed as close together as practicable in order to minimize tire wear due to an imperfection in the steering diagram. Some designers consider it a more logical plan to space the three axles about evenly, but in that case it is necessary to steer by both the front and the rear wheels. As that would leave only the center axle for driving—unless it is planned to use a combined driving and steering axle—drive would have to be through two wheels. The difficulty would be encountered, moreover, that when passing over a sharp hill crest practically all of the load would have to be carried by the middle axle, while in the opposite case of passing through a wide trough in the road, the center axle would be relieved of practically all load and the vehicle might be stalled for want of traction.

The International Motor Co. is building a six-wheeled vehicle with the conventional four-wheel bogie at the rear but only two of the wheels—the two on the forward axle—driven. In order to get sufficient traction with this arrangement, the springs of the bogie are eccentracted, the short ends connecting to the forward or driving axle. This gives a load distribution of 42 per cent on the driving axle, 33 per cent on the other rear axle and 25 per cent on the front axle. The drive of the axle is by side chains and the design of the truck in general is much like that of the Mack Bulldog. Frame suspension at the rear is by double inverted semi-elliptic springs extending between the two axles.

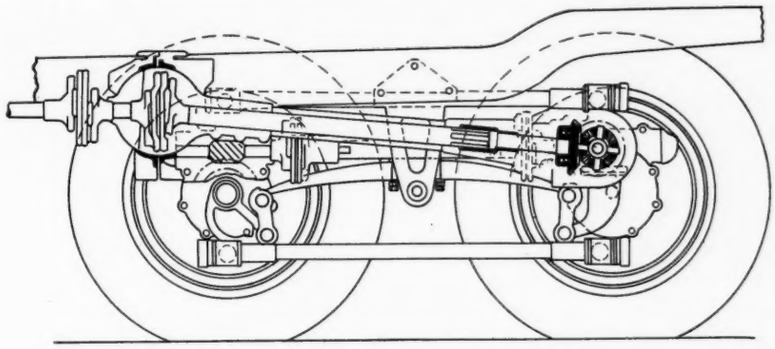


Fig. 12—Rear bogie of Berliet six-wheel colonial vehicle

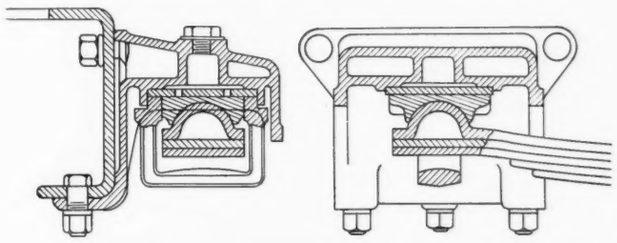


Fig. 11—Detail of spring mounting of Buessing six-wheel chassis

Owing to the unusual flexibility of most rear bogies, special care must be used in laying out the brake linkage so that the setting of the brakes may not be affected materially by loading and road conditions. If the rear springs swivel around a trunnion on the frame the junction point between the linkage supported on the frame and that connecting to the brakes on the road wheels should lie in the axis of the trunnion when the brakes are applied. In that case the rise and fall of the road wheels as they pass over road obstructions will not affect the brake setting. In order to prevent spring action from interfering with the brake action the links extending from this junction to the brake levers should run parallel with the main leaves of the springs.

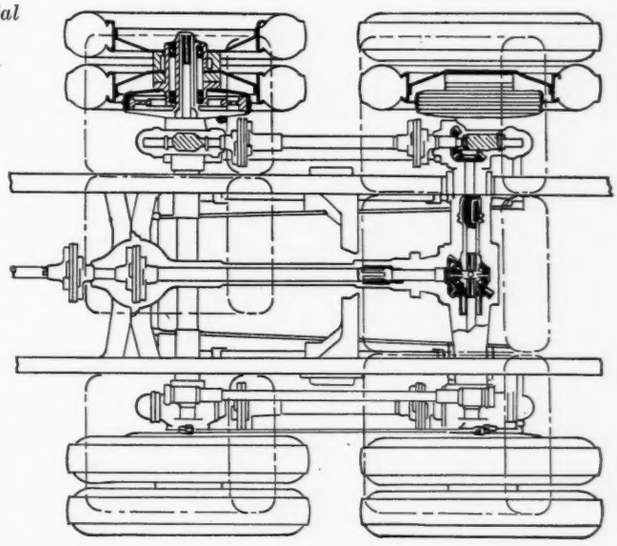


Fig. 12-A—Plan of Berliet rear bogie

German Motor Vehicles for Municipal Use

THE development of motor vehicles for municipal use seems to have followed somewhat different lines in Germany than in most other countries, for whereas outside of Germany certain firms have specialized in such municipal vehicles as motor-propelled sprinkling wagons, street sweepers, garbage trucks, fire engines, etc., building both the chassis and superstructure, in Germany, with one exception, the chassis and the superstructure are made by different firms and a special industry devoted to superstructures for municipal vehicles is being created.

This subject of municipal vehicles is fully covered in the first volume of a two-volume set on Special-Purpose Motor Trucks by L. B., published by Hermann Meusser, Berlin, the full title of the volume being "Municipal Vehicles, Dump Trucks, Tank Trucks, Special Vehicles." The second volume is to deal with Police Vehicles, Ambulances and Omnibuses.

The author is evidently an admirer of Henry Ford, for on his fly-leaf he quotes some of Ford's aphorisms about placing service above self, disregarding competition, the folly of dreading the future and worshipping the past, etc. The volume deals with practically all of the different types of vehicle that can be used in municipal services, even some that we never see used by municipalities here, such as tower wagons for trolley lines, because all or nearly all of our electric plants are privately owned.

One of the most pleasing features of the book is the frankness of the author. He has his opinion in regard to almost every question that comes up in connection with the use of motor vehicles in this service and he does not hesitate to express it. It is his opinion, for instance, that the use of storage battery vehicles in municipal services is an absolute mistake. Their introduction in German cities was favored by the fact that at the outbreak of the war all of the gasoline vehicles were taken from the cities for army use and the field was therefore free. Berlin at that time was overstocked with electric vehicles and it is evidently impossible to junk them before they are worn out.

The author also regrets the wide divergence of views among managers of municipal motor fleets as to the requirements in such services. This prevents standardization and mass production, and as a result the prices of most vehicles are a good deal higher than they should be.

The volume under review deals successfully with motor street sweepers, sprinkling wagons, combined sweepers and sprinklers, snow plows, sewage wagons, garbage wagons, manhole and sewer cleaning wagons, tower wagons, cable wagons, repair wagons, dump trucks, fuel tank wagons and trailers of various kinds. Both German and non-German vehicles are described and the volume is profusely illustrated. The style of treatment might be described as semi-technical, being intended evidently to appeal particularly to the men in charge of municipal services.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

Saturday, August 6, 1927

New Models Bring Gains in Sales and Production

PHILADELPHIA, Aug. 6—A considerable increase in sales of automobiles is looked for during the present month, the main reason for this being the presence on the market of many new models. Better business has been marked since the introduction of models in several lines in July, these coming too late, however, to affect materially the showing in that month.

Factory production will be stimulated during the month by the necessity of getting new demonstrator cars to dealers, this alone assuring capacity output for a time, aside from retail sales developments. As a large number of big production companies have brought out models in the past six weeks, this will make for a good production volume, especially in cars ranging from $750 to $2,000.

From a retail sales standpoint, the new models will meet a number of favorable conditions. Cost of licenses are reduced in many states as of Aug. 1, this causing many buyers to hold off taking deliveries in July. Excellent crop conditions and prices in the West and South are causing dealers in those sections to look for good fall sales.

Stocks of new cars in dealers' hands are reported to be low, with used car stocks also showing steady reduction in most sections. Ford dealers are de-

Continued on page 212

Hudson and Nash Set July Records

PHILADELPHIA, Aug. 3—Reports of record-breaking production in July have been received from Hudson Motor Car Co. and Nash Motors Co. The Hudson company reported shipments of 37,764, the largest month in its history. Nash reported its July business as 14,956, 71 per cent more than in any previous July.

Nash business in August will not only surpass the July total but will go down as the largest single month the company has ever had, said E. H. McCarty, general sales manager of the company.

Champion Adds Equipment

TOLEDO, Aug. 1—Champion Spark Plug Co. has just completed the largest half year's business in its history and is closing down two weeks for inventory. At this time additional machinery will be installed and several departments revamped to permit increased production in anticipation of the forthcoming new Ford model. Some other customers are also planning larger schedules.

Mercedes-Benz Six to be Sold in U. S.

NEW YORK, Aug. 4—Country-wide dealer distribution of a new small six-cylinder Mercedes-Benz car is planned by the Mercedes, Benz Co., Inc., 247 Park Ave., New York, a subsidiary of Daimler-Benz, A. G., with head offices at Stuttgart, Germany, which through recent mergers is one of the largest automobile producers on the European continent.

The new car, which was brought out in Germany late this spring, will shortly be introduced to the New York public, an advertising campaign having already been prepared. Models at New York delivered prices are as follows: 5-pass. touring, $3,300; 2-door coach, $3,700; 4-door sedan, $3,900; 6-pass. conv. coupe, $4,100; 5-pass. all-weather body, $4,200.

Dealer representation in all important centers is planned by the American company of which W. R. Vogler is vice-president and general manager; E. Hennigson, treasurer, and O. O. Von Schrenk, secretary.

The chassis has a central lubrication system mechanically operated from the gear box. Cylinder dimensions of the engine are 65 x 100 mm. (2.66 x 3.94 in.). The engine peaks at 3000 r.p.m. There is a single dry plate clutch, a spiral bevel gear drive to the rear axle, and four-wheel internal brakes. The car is said to give 25 to 28 miles to a gallon of gasoline.

Marmon Net $1,239,532

INDIANAPOLIS, Aug. 4—Marmon Motor Car Co. reports net profit for the fiscal year ended July 2 of $1,239,532 after all charges. This compares with $1,669,800 in the previous year. Current assets total $6,067,136 and current liabilities, $2,119,526, as compared with $4,714,125 and $590,090, respectively, at the close of the previous year.

Buick August Schedule 26,000

FLINT, Aug. 3—Buick Motor Co. shipped 22,500 cars in July, which compares with 17,000 in June and 13,929 in July last year. The August schedule is for 26,000 cars.

Tire Makers Expect Large Last-Half Sales

AKRON, Aug. 3—There is a more optimistic feeling in tire manufacturing circles as a result of satisfactory earnings by most of the major companies in the first half year and the continued stability of retail tire prices. Prospects for the last six months of the year are regarded as bright. Current quarter is the big tire selling period of the year, and it is likely that the industry will establish a new high record for turnover in this period.

Sales and production of tires during July were heavy, being considerably above the same month last year. Plants in the Akron district are turning out more than 140,000 tires a day, with indications that high schedules will be continued during August.

Goodyear Earnings Show 75% Increase

NEW YORK, Aug. 4—Goodyear Tire & Rubber Co. reports net profit for the six months ended June 30 as $7,114,005, compared with $4,014,873 in the first half last year. Net sales for the six months were $118,244,231 compared with $116,788,924. After deducting extraordinary charges incident to refinancing expenses and dividends paid, the balance of consolidated surplus on June 30 was $24,408,283.

Directors have set aside $750,000 from net earnings of the half year, which has been added to the special raw material reserve previously created as a measure of protection against undue shrinkage in raw material values. This action was deemed advisable in view of the downward trend of crude rubber prices.

Durant in Picture Deal

LOS ANGELES, Aug. 3—George J. Whelan, tobacco magnate, and William C. Durant, head of Durant Motors, Inc., are reported here to be negotiating for the purchase outright of Universal Pictures Corp. The approximate purchase price is reported about $10,000,000.

Fisher Buys Udylite

DETROIT, Aug. 4—The Udylite Process Co. has been bought by Fred J. Fisher and the Union Carbide & Carbon Co. Executive offices will be located 3220 Bellevue Ave., this city, after Aug. 15.

Paige Drops Prices on 10 New Models

Reductions Range From $100 to $160—Refinements Made Throughout Line

DETROIT, Aug. 4—A number of changes in design and price reductions ranging from $100 to $160 on 10 of its 20 body models are announced this week by the Paige-Detroit Motor Car Co. The price reductions apply to all models in the eight-cylinder line and to four open six-cylinder models.

A new manifold with porcelain finish, rubber engine supports, an oil filter and a Lanchester vibration damper have been added to the 6-75. Four-point engine support is now used on all sixes. Radiator mounting on the 6-65 and 6-75 has been changed. Distributors have been set ahead 2 deg. The compression ratio of the 6-45 has been increased slightly by decreasing the height of the combustion chamber. Air cleaners are standard on both sixes and eights.

Bodies have been altered and are generally lower than formerly. New color schemes are being used and the instrument board has been redesigned.

Following is a list of body models offered with old and new prices:

	New Price	Old Price
6-40 phaeton	$1,095	$1,095
6-45 coupe	1,095	1,095
6-45 brougham	1,095	1,095
6-45 sedan	1,195	1,195
6-45 cabriolet roadster	1,195	1,295
6-65 landau brougham	1,395	1,395
6-65 roadster	1,395	1,495
6-65 sedan	1,495	1,495
6-75 7-pass. phaeton	1,655	1,655
6-75 5-pass. sedan	1,695	1,695
6-75 7-pass. phaeton	1,655	1,655
6-75 cabriolet roadster	1,895	1,995
6-75 coupe (4-p.)	1,895	1,995
6-75 limousine	2,145	2,145
8-85 phaeton	2,195	2,295
8-85 5-p.sedan	2,255	2,355
8-85 7-p.sedan	2,525	2,655
8-85 4-p.coupe	2,495	2,655
8-85 cabriolet roadster	2,495	2,655
8-85 limousine	2,665	2,795

Establishes Series of Branches

DETROIT, Aug. 1—During the past month Paige-Detroit Motor Car Co. has opened five factory branches in as many states. The Graham brothers, who are now in control of the Paige organization, announce that the company has adopted a policy of establishing a network of factory branches throughout the country to make possible a more direct contact with the dealers in all trade territories, as well as with the public.

Timken Earnings Increase

NEW YORK, Aug. 4—Timken Roller Bearing Co. reports for six months ended June 30, 1927, net profit of $5,406,834 after charges and Federal taxes, equivalent to $4.50 a share earned on 1,200,882 shares of no par stock, comparing with $4,903,490 or $4.08 a share in the first half of 1926.

Brockway Motor Truck Corp. reports for six months ended June 30, 1926, net income of $462,482 after interest, Federal taxes, etc., equivalent after 7 per cent dividend requirements, to $3.21 a share earned on 129,891 no par shares of common stock.

British "Stop List" Check on Used Cars

NEW YORK, Aug. 3—Active interest in various used car plans abroad was reported by Alfred Reeves, general manager of the National Automobile Chamber of Commerce, on his return from a survey of European conditions. Mr. Reeves also found active measures under way to broaden the European market for motor cars and a disposition to reduce the heavy luxury taxes on cars, together with a general appreciation that more highways are needed and that funds collected from motorists should be expended on highways.

Sales of motor cars are increasing, even in countries where general business is not good and most American cars have been doing very well.

With regard to used car plans, Mr. Reeves said:

"Many plans have been tried abroad but they generally failed because they attempt to run the dealers' business.

"The Windsor plan, now in operation in some American cities, is being tried by some of the dealer associations but most drastic measures have been taken in England by the Motor Agents Association, working in cooperation with the Motor Trade Association, which is an organization of manufacturers formed for the express purpose of maintaining prices in the motor trade.

"Although perfectly legal in England, in this country it would be considered a violation of the Sherman law, or a subject for investigation. Membership in the Motor Agents Association is a badge by which the manufacturer knows to whom dealer discounts should be given.

"Cars taken in trade cannot be sold within three months at less than the allowed price under penalty of the dealer being placed on the 'stop list.' This list is issued monthly and gives the names of dealers to whom manufacturers are not to sell their products."

Chandler Profit $675,006

CLEVELAND, Aug. 3—Chandler-Cleveland Motors Corp. reports net earnings for the first half of 1927 as $675,006, the June quarter with a net of $411,603 showing an increase over the March quarter which earned $263,403. Net income in all of 1926 was $401,330. The company reports gross shipments in July as 70 per cent greater than shipments in July last year.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co.*

NEW YORK, Aug. 4—Conditions in general trade have not altered to any marked degree during the past week. With an improved outlook for crops, prices of agricultural commodities have yielded slightly, while stocks have continued to rise to new records on the basis of favorable half-year reports from leading industrial corporations. Further concessions in money rates have reflected the prevailing abundance of funds available for short-term investment.

FREIGHT CAR LOADINGS

Railway freight car loadings for the week ended July 16 totaled 1,016,782, an increase of 177,474 as compared with the week previous, but 59,590 cars below the number loaded in the corresponding period last year. Loadings for the year to date total 28,204,078 cars, which compares with 28,048,720 a year ago and 27,194,436 two years ago.

PETROLEUM PRODUCTION

Production of crude petroleum established a new high record during the week ended July 23. The average daily output totaled 2,573,850 bbl., as against 2,544,250 bbl. a week earlier and 2,070,950 bbl. in the corresponding period a year ago. Prices for crude oil were virtually unchanged last week, while gasoline prices were lower in certain sections.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended July 27 were 6 per cent below the amount for the preceding week, but reached a total 11.8 per cent above that for the like period last year.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices advanced last week to 139.5 from a figure of 137.9 for the previous week, which was the lowest for the year. Four weeks ago the index was 138.8.

FEDERAL RESERVE REPORT

Total bills and securities held by the Federal Reserve banks decreased $21,900,000 during the week ended July 27, with declines of $5,200,000 in bills discounted, $16,000,000 in bills bought in the open market and $800,000 in holdings of Government securities. Deposits declined $16,300,000 and circulation of notes was $14,700,000 lower than in the preceding week. The reserve ratio rose from 78.8 to 79.7 per cent, which is the highest figure for the ratio since the second week of May.

During the same period, loans of reporting member banks declined $4,880,000, although loans secured by stocks and bonds increased $29,944,000. Investments showed an increase of $6,174,000 over the preceding week, while borrowings from the Federal Reserve banks were off $13,632,000 and net demand deposits were $39,904,000 lower.

Buckman to Promote Service Tool Shows

Working Exhibits Expected to Be Staged in Many Leading Trade Centers

NEW YORK, Aug. 1 — Herbert Buckman, manager of the Cleveland Automobile Manufacturers & Dealers Association, has been selected by service shop equipment manufacturers to handle all the central bureau and promotion details of the shop equipment exhibits at the 1928 regional automobile shows.

Mr. Buckman's appointment was decided on at group meetings of the manufacturers held in New York, July 21, and in Chicago, July 27, at which most of the shop equipment builders who participated in last winter's exhibits were present.

There is every prospect that working shop equipment exhibits will be staged by jobbers in the automobile shows in Philadelphia, Baltimore, Tampa, Buffalo, Detroit, Cleveland, Louisville, Cincinnati, St. Louis, Kansas City, Milwaukee, San Francisco and Los Angeles, next year, with a possibility of other exhibits in Columbus, Minneapolis and Dallas.

Plans are already under way to start the show program much earlier this year, so that they will be better in every way and may be promoted to bring a maximum attendance. It is hoped the shop equipment exhibit program may be settled in all its details at a final meeting during the Automotive Equipment Association show in Chicago in November.

The shop equipment exhibits in New York, Chicago and Boston, will be in charge of the Motor & Accessory Manufacturers Association, as in the past.

Show Managers Discuss Association Activities

CHICAGO, July 30 — Cooperative dealer junk yards, regional shop equipment exhibits for the 1928 automobile shows and the Windsor used car plan were discussed at the annual beforeshows convention of the National Association of Automobile Show & Associated Managers held here this week.

A. B. Waugh, commissioner of the Omaha Automobile Dealers Association, outlined the methods that have made the junk yard there very successful and the interest manifested in the subject shows that many dealer associations are planning to use this method of handling junk cars.

R. W. Proctor of Black & Decker Co., and Neal G. Adair of the Motor & Accessory Manufacturers Association, were the principal speakers on the shop equipment exhibits program.

Floyd A. Allen of General Motors Corp., and C. A. Vane, general manager of the National Automobile Dealers Association, covered the Windsor plan.

Swedish Institute to Lower Car Costs

WASHINGTON, July 30— The establishment of an Automobile Testing Institute in Stockholm, Sweden, which will be in operation in September, is reported to the automotive division of the Department of Commerce. The institute will be under the charge of Prof. E. Hubendick of the Stockholm College of Technology, said to be Sweden's foremost expert on internal combustion engines.

The purpose of the institute will be to make adjustments on automobiles in order to obtain the least possible consumption of gasoline, oils, etc., and will, it is expected, mean the saving of a large percentage of Sweden's annual gasoline consumption bill.

Milwaukee Dealers Push Salvage Plan

MILWAUKEE, Aug. 1—Frank J. Edwards, head of the Edwards Motor Car Co., Dodge Brothers distributor, has been elected president of the newly organized Auto Trade Salvage Co. of Milwaukee, consisting of members of the Milwaukee Automotive Dealers' Association. Clarence P. Hatter, owner of the East Side Buick Co., was elected vice-president; John G. Wollaeger, Studebaker, treasurer, and Francis A. Cannon, secretary. Mr. Cannon recently joined the M. A. D. A. as executive secretary. Directors include Bert F. Anger, Willys-Overland; R. W. Leach, Reo; Leslie Bailey, Ford, and George Merkle, Chevrolet.

The new salvage company has built and equipped a warehouse and machine shop in the Menomonee valley at Milwaukee and plans to junk 5000 cars during the first year of operation. It is conservatively figured that there are 15,000 cars now on the streets of Milwaukee that should be rendered into scrap in the interest of public safety and for the protection of dealers.

Divco Truck in Production

DETROIT, July 30—The Divco-Detroit Corp. has completed remodeling its factory and is now on quantity production of the new Divco truck. The truck is designed for house-to-house delivery work and has three-point control. It is especially adapted for use by milk and bakery companies.

Approve Collins-Aikman Change

PHILADELPHIA, July 30—Stockholders of Collins & Aikman Co. have approved formation of a new corporation to be known as Collins & Aikman, Inc., and the acquisition of Cranston Woolen Mills, Fred Pearson & Co., and A. T. Baker & Co.

$3,000,000 Expansion is Started by Olds

New Plants and Facilities to Permit Larger Operations After Jan. 1

LANSING, Aug. 1—Olds Motor Works have let contracts for buildings in a $3,000,000 expansion program and work will be rushed on the project so that Oldsmobile production can be increased by Jan. 1, I. J. Reuter, president, has announced. An increase in net sales of $11,500,000 last year followed by still greater sales records made the program necessary, he said. Retail sales for the fiscal year ending Aug. 1, show continued gains.

The buildings will be erected on the 76-acre Oldsmobile plot in Lansing and will increase the total floor space by 292,000 sq. ft. Total floor space, including the body plant, will be 1,688,092 sq. ft.

Contracts already awarded are for buildings which will double the engine plant and enlarge other manufacturing facilities to permit increased production, and will also provide additional shipping facilities. The new engine plant will duplicate the modern structure erected by Oldsmobile at a cost of approximately $1,000,000 less than six years ago and will adjoin it. The plant will be two stories high and will contain 90,000 sq. ft. of floor space.

Contracts have also been let for another two-story building containing 202,000 sq. ft. of floor area. It will be erected along one side of the present loading and shipping dock and will be 900 by 138 ft. This building will concentrate loading and shipping operations and will be equipped with enclosed railroad sidings. This building will permit several changes in factory layout and will release a large amount of additional space for manufacturing operations.

Due to the substantial increase in sales of Oldsmobiles in the export field, the entire facilities now used for both domestic and export shipping will be devoted exclusively to the export business. Present docks will be enclosed and additional facilities for the boxing of export shipments will be installed.

The program also calls for additions to the power house facilities to meet heavier requirements imposed by the additional plants.

Nebraska Airways Formed

KANSAS CITY, Aug. 1—Kansas City is soon to be placed in a regular airplane passenger schedule between here and Lincoln, Neb. A company has been organized in Lincoln, known as the Nebraska Airways, Inc., and a regular schedule will be maintained. A line to Sioux City, Iowa, also will be established. The company already has initiated plane passenger service between Lincoln and Omaha, Neb.

Exports, Imports and Reimports of the Automotive Industry for June of Current Year and Total for Six Months Ending June, 1927

	Month of June				Six Months Ending June			
	1926		1927		1926		1927	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories	..	$22,373,056	..	$29,029,340	..	$172,673,568	..	$212,078,321
Electric trucks and passenger cars	..	..	9	15,949	31	56,666	56	80,135
Motor trucks and buses (total)	4,580	3,393,191	6,814	4,472,031	35,053	24,357,657	54,725	34,562,184
Up to 1 ton, inclusive	3,473	1,598,743	5,520	2,556,839	27,817	12,811,799	45,703	20,971,057
Over 1 and up to 2½ tons	903	1,171,050	1,149	1,524,736	6,085	7,968,214	7,883	10,226,328
Over 2½ tons	204	623,398	145	390,456	1,151	3,577,644	1,139	3,364,799
PASSENGER CARS								
Passenger cars, except electric (total)	15,355	11,816,491	20,815	16,052,935	126,427	93,279,339	159,770	117,143,562
Value up to $500, inclusive	5,466	2,107,599	2,955	1,079,694	51,436	19,444,382	41,174	15,279,029
Value over $500 up to $800	4,786	3,191,137	8,145	4,613,092	35,367	24,143,034	54,376	31,537,427
Value over $800 up to $1,200	3,702	3,815,028	6,273	5,267,348	30,348	32,035,795	42,821	37,675,637
Value over $1,200 up to $2,000	945	1,473,072	2,661	3,287,654	6,358	9,693,496	16,554	20,851,621
Value over $2,000	456	1,229,655	781	1,805,147	2,918	7,962,632	4,845	11,799,848
PARTS, ETC.								
Parts, except engines and tires	..	..	..	..	..	..	..	..
Automobile unit assemblies	..	2,561,324	..	3,306,674	..	24,034,168	..	26,152,609
Automobile parts for replacement	..	2,759,500	..	3,438,099	..	17,668,952	..	22,614,200
Automobile accessories	..	792,366	..	670,893	..	5,037,503	..	4,389,909
Automobile service appliances (n. e. s.)	..	676,421	..	736,355	..	3,592,520	..	4,230,442
Station and warehouse motor trucks	29	34,259	38	24,467	95	91,537	173	106,090
Trailers	30	17,192	52	20,648	593	213,779	465	201,345
Airplanes, seaplanes and other aircraft	15	81,503	1	3,445	26	123,941	19	311,610
Parts of airplanes, except engines and tires	..	12,915	..	78,437	..	98,712	..	189,178
BICYCLES, ETC.								
Bicycles and tricycles	422	12,452	353	10,291	2,859	82,742	2,210	63,694
Motorcycles	1,591	343,592	1,454	316,315	13,485	2,918,411	11,089	2,476,518
Parts, except tires	..	105,315	..	102,648	..	887,394	..	688,735
INTERNAL COMBUSTION ENGINES								
Stationary and Portable								
Diesel and Semi-Diesel	78	66,832	88	142,887	434	680,777	392	713,722
Other stationary and portable:								
Not over 10 HP.	2,690	248,600	1,438	138,304	15,434	1,363,121	13,706	1,176,953
Over 10 HP.	149	189,309	119	110,647	954	934,445	833	756,028
Automobile engines for:								
Motor trucks and buses	49	22,900	714	108,241	1,885	263,206	3,408	401,847
Passenger cars	10,477	1,027,284	8,182	964,518	84,110	7,976,077	65,908	6,733,875
Tractors	168	56,568	18	2,499	804	446,114	804	366,143
Aircraft	30	93,843	6	14,370	254	428,406	69	123,892
Engine accessories and parts	..	372,779	..	322,316	..	2,250,487	..	1,992,018
IMPORTS								
Automobiles, including chassis (dutiable)	54	102,092	52	121,534	336	609,648	281	548,008
Other vehicles and parts for them (dutiable)	..	48,003	..	56,538	..	381,512	..	515,118
REIMPORTS								
Automobiles (free from duty)	34	45,287	8	9,165	86	119,849	96	150,771

June Exports Show $6,757,911 Increase

WASHINGTON, Aug. 2—Automotive exports in June, according to revised figures announced by the Department of Commerce, totaled $30,649,149, compared with exports in June, 1926, of $23,891,238.

The exports in units were 27,629 cars and trucks. Of this number 20,815 were cars and 6814 were trucks. Comparing the exports with the production figures for June, the percentage of vehicles exported was 8.8 per cent of the total manufactured. During June 274,374 passenger cars were manufactured, of which 7.6 per cent were exported, while 40,178 trucks were produced of which 17 per cent were exported.

The figures for the first six months of this year show that a total of 1,779,334 passenger cars were manufactured in this country and of this number 159,770 were exported, or 9 per cent. During the same period 248,506 trucks were made and 54,725, or 27 per cent were exported.

The average value of passenger cars exported in June increased from $656 to $771, compared with the preceding month, while the truck values increased from $645 to $743 per unit.

June Car Imports Lower

WASHINGTON, Aug. 3—Automotive imports into the United States during June totaled 50 units, having an aggregate value of $121,534, according to figures announced by the Department of Commerce. This is smaller than the May imports of 80 passenger cars and trucks, valued at $136,740. Parts and accessories imported in June were $56,530, or about $20,000 less than parts imported the previous month.

Japanese Truck Makers Limited Market Factor

WASHINGTON, July 30—American manufacturers of trucks doing an export business in Japan, will have little, if any, competition from domestic manufacturers for sime time in the future, according to a report to the Department of Commerce from the commercial attache at Tokyo.

He reports that Japan has made little progress in the manufacture of motor trucks, the only commercial production being that of the Wolseley and D. A. T. trucks which have a combined output of less than 500 trucks per year. The latter company receives a substantial subsidy from the government and is not expected to offer serious competition to American manufacturers since it produces in very small quantities and is really a military rather than a commercial project.

Builds Truck at Prague

WASHINGTON, Aug. 2—The Skoda Automobile Works at Prague, Czechoslovakia, heretofore manufacturers of only light passenger cars, has brought out a 1-ton truck of 23 hp. equipped with four-wheel brakes which sells for $1,500, according to report made to the U. S. Department of Commerce.

Citroen to Build Low-Priced Six

WASHINGTON, Aug. 2—The depression in France, which is affecting all industries, has not as yet been felt by the Citroen company, which is operating at full capacity, says a report to the Department of Commerce, from Trade Commissioner Louis Hall, at Paris.

The present daily production exceeds that of the best previous record of 400 cars, he reports. The company's leading model is a 10 hp. car which is being offered more completely and luxuriously equipped than ever before. The company has announced that it will introduce a new six-cylinder car, reported to be the lowest priced six on the European market.

U. S. Leads in Spanish Market

WASHINGTON, Aug. 2—American made automobiles are rapidly gaining in popularity in Spain, in comparison with other makes of automobiles, according to a report from Consul A. C. Brady, at Malaga, to the Department of Commerce. The increase in registration in 1926 amounted to 43 per cent over the registration of 1925. Of the increase 70 per cent were automobiles of American manufacture, 13 per cent of French and 10 per cent of Italian make, the remaining 7 per cent being made up principally of vehicles of Spanish, German and British manufacture.

Men of the Industry and What They Are Doing

Rubber Shortage Coming in 3 Years, Says O'Neil

Reports that by bud grafting rubber trees could be made to yield from 70 to 95 lb. of crude rubber a year against the present average of 3½ lb. were met this week by the prediction of William O'Neil, president of General Tire & Rubber Co., that the world faces a shortage of crude rubber within three years.

Mr. O'Neil pointed out that increased production through bud grafting is necessarily many years off. Meanwhile, consumption is increasing much more rapidly than production. Despite his belife that a rubber shortage is in prospect, Mr. O'Neil said, before he sailed on the Aquitania for England, that there is no immediate likelihood of increased tire prices. However, he does think that advances will be made next year as he looks for higher prices of crude rubber.

Rubber manufacturers, said Mr. O'Neil, do not expect experiments with rubber growing in the United States to have an appreciable effect on the situation because of high labor costs here as compared with the eastern producing centers, where the daily wage is 20 cents.

Frank R. Henderson, president of the Rubber Exchange of New York, received today a report from Major Henry Gough in the Malay States, telling of the successes in bud grafting experiments. Major Gough predicts an enormously expanded utilization of rubber as the result of the low prices that will be brought through bud grafting.

Kennedy Joins Mason

James T. Kennedy has resigned as manufacturers' sales representative of the Goodyear Tire & Rubber Co. to become vice-president in charge of manufacturers' sales of the Mason Tire & Rubber Co. Mr. Kennedy will open headquarters in the General Motors building, Detroit, where he will make his headquarters.

Cullen Heads Manufacturing

Columbia Tire Corp. reports a reorganization of the various departments which includes the promotion of J. F. Cullen to manufacturing manager, according to William Cornfoot, president. Alfred A. Aya is vice-president; Amedee M. Smith, Ben C. Dey, George F. Heusner and J. F. Cullen, directors. The present policy of the company is to confine sales efforts to the Pacific Coast.

Fred Fisher Gets Hole in One

Fred J. Fisher, vice-president of General Motors Corp., joined the ranks of the golfing elect last week with a hole in one at the Bloomfield Country Club. Mr. Fisher scored his ace on the 160 yard par 3, fifth hole, using a number 4 iron.

Teagle in Germany to Discuss Benzine

Walter C. Teagle, president of the Standard Oil Co. of New Jersey, has arrived at Mannheim, Germany, for a conference with the heads of the German chemical dye trust. It has been reported that the conference would concern the question of developing an American selling organization for the new German synthetic benzine. No statement, however, was made by the participants in the conference.

Leon Dodge Forms Company

Leon G. Dodge, veteran automobile executive, has formed the Leon G. Dodge Co. and will merchandise Oldsmobiles in Los Angeles. Mr. Dodge formerly resided in southern California, leaving there some years ago when he joined the Oldsmobile factory organization. During his connection with the Oldsmobile company he was assistant general sales manager and also manager of the Oldsmobile branch in New York.

Moskovics Demonstrates Stutz

F. E. Moskovics, president of Stutz Motor Car Co. of America, Inc., with Bert Dingley, factory service manager, and H. E. Fisher, final inspection chief, are on a trip to northeastern distributing centers, on which they are demonstrating to Stutz dealers and their organizations performance characteristics of the Stutz line.

Fulton Heads Gideons

Samuel A. Fulton, president of the Fulton Co., manufacturer of automotive equipment, has been reelected president of the Gideons, the Christian commercial travelers' association of America, at the recent national convention in Indianapolis. During his first term last year the Gideons placed 100,277 Bibles in hotels of America, China, Japan and Korea.

Castle With Poster Company

F. E. Castle, until recently manager of the Detroit office of the Hayes Wheel Corp., has been made vice-president of the Commercial Poster Co. of Cleveland, and will manage the Detroit office.

Riddell Buys Companies

BUCYRUS, OHIO, Aug. 3—W. A. Riddell Co. has purchased the Hadfield-Penfield Steel Co., the American Clay Machinery Co. and the Era Steel Co. Business of each of these companies will be continued and developed under the new ownership.

F. W. Young Organizes New Radiator Company

RACINE, Aug. 1—Fred W. Young, formerly vice-president and general manager of the Racine Radiator Co., has organized the Young Radiator Co. here to engage in the manufacture of radiators, condensers and other cooling devices for automobiles, trucks, tractors and industrial engines. The capital stock consists of $125,000 preferred and 2500 shares of no-par common. Definite plans for manufacturing have not been made public. The Racine Radiator Co. recently bought a site of 10½ acres in Milwaukee and is erecting a complete new plant at that point, to be ready about Sept. 1 or 15, when the Racine factory will be abandoned.

Seeks Wilson Liquidation

MOLINE, Aug. 1—Stockholders of the E. H. Wilson Body Co. have failed to subscribe the $300,000 necessary to provide new capital for the business, and L. L. Harr, receiver, has announced that he will ask the Federal court for authority to liquidate the plant if one of the large automobile concerns now negotiating for the property does not complete the deal. Stockholders were unable to agree upon new executive personnel of the company if the funds were raised and the plant, which has been showing good profits is likely to go through a complete dissolution.

Hugo L. Waldman

FLINT, Aug. 1—Hugo L. Waldman, 65 years old, who came to Flint with Charles S. Mott and assisted in the organization of the Weston-Mott Axle Co., died Friday of a complication of diseases. Mr. Waldman was educated in the Royal Technical Institute at Stuttgart, Germany. He had not been active in automotive circles for several years. Besides a widow he leaves one daughter, Mrs. Nellie Goering.

H. O. Seymour

MILWAUKEE, Aug. 1—H. O. Seymour, director of the Chain Belt Co., died July 23 at his country home, Lake Geneva, Wis. Mr. Seymour was a director of Chain Belt Co. since 1918. He was also president of the First Wisconsin Trust Co., executive vice-president of the First Wisconsin National Bank, and vice-president of the First Wisconsin Co., all of Milwaukee.

F. H. McSorley

DETROIT, Aug. 2—F. H. McSorley, assistant treasurer and credit manager of United Motors Service, Inc., died at Ford Hospital, Sunday, after an illness of eight days. Mr. McSorley was 38 years of age and had been with United Motors about eight years. Interment will be made at Hancock, Mass.

Ford Sees New Car Outstripping Model T

Will Sell 15,000,000 in Quicker Time He Says on 64th Birthday

DETROIT, Aug. 1—Henry Ford celebrated his sixty-fourth birthday Saturday with the declaration that he believes his new automobile will prove even a greater success than the Model T. "Details of the new car will be announced within a few weeks," he said. Mr. Ford smiled while discussing the many Ford rumors, which he branded as having no foundation.

"We have taken time to design and build this new Ford car so it will be just what a good automobile should be in this day. We built 15,000,000 Model T cars in 19 years, and we expect to build many more than 15,000,000 of the new cars in much less than 19 years.

"We have no desire to take business away from any automobile manufacturer. Our thought always has been that the automobile business is prosperous only when all makers of cars are busy. If any particular automobile company's success meant putting out of business some other automobile manufacturer, there would be no gain. It would only mean putting thousands of men out of work, letting valuable power go to waste, and maybe throwing a great industry out of balance."

He pointed out that the Model T during 19 years paid salaries and wages amounting to $1,970,414,972 and during the same period Ford dealers paid service employees $1,333,800,000, while dealers' wages to salesmen and office help aggregated $1,380,000,000. Total salaries paid by authorized Ford shops and service stations aggregated $1,778,000,000.

Material used in the Model T cost $4,868,427,000 and taxes paid were $547,000,000. Before they are all junked the Ford company estimates the Model T's will have required 60,000,000,000 gal. of gasoline, 1,800,000,000 gal. of oil and will have traveled 1,185,000,000,000 miles.

Gradual New Car Output Seen Under Way Sept. 1

DETROIT, Aug. 1—It is held doubtful in automotive circles if the new Ford car will be ready for production before Sept. 1. Large numbers of Ford workers continue to be laid off, while production lines are being completely overhauled and the plants tooled up for the new job. Despite the fact that the city is preparing augmented street car service beginning Sept. 1 to take care of the return of Ford workers to their jobs persons close to the situation are of the opinion that Ford will enter production on the car gradually.

It is reported here that the Ford company has countermanded an order to all dealers to send their service men to Detroit at the expense of the company on Aug. 18 for a special two-weeks' course in service on the new car. It is stated that in countermanding the order the company has instructed dealers to have their service men in readiness to proceed to Detroit upon notice. While some feel that this action indicates that the Ford company will hasten the school there is no statement.

Driggs Sport Planes Priced About $1,750

DETROIT, Aug. 1—Completion of the first of a series of 10 sport planes, built to determine production cost at the new Lansing factory of the Driggs Aircraft Corp., has been announced. These planes are of the semi-cantilever monoplane type, and are powered with 45 hp. Anzani radial air-cooled engines. It is expected that the ships will retail at around $1,750. They are two-seaters, and of the open cockpit type. High speed is said to be about 90 miles per hour.

Bassick Takes Over Control of Garford

DETROIT, Aug. 1—Control of the Garford Truck Co., of Lima, Ohio, has been purchased by E. W. Bassick, and associates, who also own Relay Motors Corp., Wabash, Ind.

The Relay corporation was formed recently through a combination of Commerce Truck Co., of Ypsilanti, Mich., and Service Motors, Inc., of Wabash. The Commerce business was moved to Wabash several months ago, where it has since been conducted.

The entry of the Garford company into the merger makes it the largest combination in recent years within the truck industry. Assets of the combined companies aggregate approximately $10,000,000.

Hupp Wins Spanish Race

DETROIT, Aug. 1—Word has been received by Hupp Motor Car Corp. of the awarding of a cup and medal to a Hupmobile Six in the annual road race held at Viscaya, Spain. The race covered 230 kilometers and competing cars had to run at a uniform speed of 40 kilometers an hour, penalties being imposed for failure to arrive at control points at fixed time.

Gets Restraining Order

INDIANAPOLIS, Aug. 1—A preliminary injunction has been granted to the Koolfast Radiator Co. of Toledo, in Federal Court here, restraining Hubert McGinnis and Otis A. McGinnis from infringement upon a combined muffler and cut-out patent.

Stout Line to Fly Detroit-to-Cleveland

Will Discontinue Grand Rapids Line Until Service Can Be Extended

DETROIT, July 30—Stout Air Services, Inc., will inaugurate a new air line beginning Sept. 1, between Detroit and Cleveland, Stanley E. Knauss, manager, declared today. The company is discontinuing its air line between Detroit and Grand Rapids until such time as special planes and radio direction equipment can be supplied for the line's extension across Lake Michigan to Milwaukee and ultimately to Minneapolis and St. Paul.

Mr. Knauss stated that the Grand Rapids line has served as the company's experimental laboratory for testing equipment, rates and schedules so that further operations could be based on fact and experience. The revenues, he said, did not pay operating expenses but they did pay more than the company had expected. A total of 2000 passengers were carried on the Grand Rapids line and the planes travelled 80,336 miles without injury to passengers or operating personnel. Since June 1 the company has carried 4500 passengers on excursion flights over and around Detroit.

Chamberlin Paves Way for Ship-to-Shore Plan

NEW YORK, Aug. 3—Following the successful hop of Clarence D. Chamberlin with mail from the Leviathan, almost 100 miles at sea, plans are being made by the United States Lines for a ship-to-shore air service designed to cut at least one day from the time of trans-Atlantic mails.

The hop was made from a 114 ft. slanting runway built diagonally between across the steamship between stacks. The plane rose in 75 feet when released. Completing the flight Chamberlin said there was no trouble taking off, despite a 14-mile wind, and that he could just as well have carried passengers. He considered the justification of a runway rather than a catapult, the most important aspect of the flight.

Motorcycle Sales Increase

SPRINGFIELD, MASS., Aug. 3—Every month of 1927, with the exception of May, has shown a sales increase over 1926 and quotas for 1928 are set for a 20 per cent increase, J. B. McNaughton, sales manager of the Indian Motorcycle Co., told sales representatives at the annual sales conference. Forty men, including factory executives, took part in the meetings. Louis E. Bauer, chairman of the executive committee, spoke optimistically on business prospects.

New Models Increase July Sales Total

(*Continued from page 206*)

clared to be practically cleaned out of cars, both new and old, and devoting all their attention to taking orders on the new car. This augurs a particularly favorable volume of business for the new model when introduced.

Reports from leading trade centers follow:

NEW YORK

Sales of new cars in the New York metropolitan district during July held firm though showing decline from the preceding month. Early indications were that the month would run well ahead of the same month last year. Very favorable reception of new models introduced during the month was noted. Used car conditions are favorable. The general business situation favors high sales volume in the latter months of the year and August is expected to show large increases over July.

BOSTON

Motor car dealers are feeling a great deal better now that Aug. 1 has passed. They have felt the gradual resistance being built up against sales through buyers waiting to see what the big companies would announce. The tension has eased and salesmen find it easier to book orders. July was a very good month. Sales did not jump but they began to be more steady. Total sales for all cars will not show a marked increase because of the big hole left through Ford being out of the market.

Used car stocks eased off considerably. Truck sales were not showing any large increase, particularly in the larger units, but they were not altogether too low. Outside dealers are showing signs of life and this is helping distributors.

ATLANTA

Though July sales held up fairly well, the total volume of business appears to have been somewhat less than in July 1926, and also below the normal level. Most distributors agree that the outlook during the late summer and fall gives promise that sales will be better than they were during that period last year, because of the high prices now prevailing for cotton and other leading crops. The percentage of repossessions continues fairly large and there are large stocks of used cars. Motor truck sales were less active than the same month last year, and are reported to have declined compared with business the first half of the year.

NEW ORLEANS

Sale of tires and all accessories are around 20 per cent off in this territory due to many roads still being impassable from flood waters. The used car market now is in fairly good condition after stocks were moved at heavy sacrifices. Sale of new cars are 15 to 18 per cent off this month. Believed that anticipation of new Ford car is hurting sales in the light car field. Trade in general is optimistic as rehabilitation work is going forward rapidly in flooded areas.

MILWAUKEE

Business has picked up surprisingly well following display of new models by several large makers, and July passenger car sales are believed to be fully equal to a year ago. June sales for Wisconsin were 185 cars ahead of last year despite enormous shrinkage in Ford business. Every principal make showed gains to assist Chevrolet increase in keeping total above last year for a new June record for this territory. July has become optimistic in all lines of trade, reversing conditions existing year ago.

DALLAS

General rains followed by excellent cotton crop weather maintained July automotive business along the lines of the preceding month and left dealers more optimistic. The outlook for the remainder of the year was said to be decidedly better. The buying trend in the rural districts is much stronger than 30 days ago. New model cars had something to do with steady sales, dealers said. Ford sales continued at low levels due to expectations of the new Ford car most any day. Used car sales about same as for June with stocks fairly heavy and prices low. Truck sales showed some improvement. Cotton belts expected to be best buyers for remainder of year so far as small low priced trucks concerned.

KANSAS CITY

July sales of new cars have been very satisfactory in the Kansas City territory with probably the light cars showing some falling off. The multiplicity of new models being announced, while creating much interest on the part of the public also has had more or less of a confusing effect. Price reductions announced in several cases has more than offset this, however, and virtually all the larger dealers are reporting increases over last year. There still is a marked tendency on the part of the lower priced car prospects to wait for the new Ford models. Used car sales for the month were much better than last July, dealers reported. Truck sales were active.

DENVER

Small cars with the exception of Fords moved well in July in Denver territory and in general throughout the state. There was almost no business in heavy trucks and business in light trucks was less than in June or in July of last year. Large cars did not move as well as smaller models, but the business done compares favorably with July of last year. The so-called Horn territory has been hard hit by one of the worst hail storms in the history of Colorado. Business will be much slower in that territory this fall than previously anticipated.

DETROIT

New car sales for July, in Michigan, will be considerably below those of a year ago. Sales in Wayne County, including Detroit, are far below last year—a condition due principally to unemployment especially in the Ford factory. Wayne County passenger car sales for the first 26 days were 4164, compared with 7308 units for the entire month last year. Demand for commercial vehicles is similarly affected. Ford dealers have cleaned up Model T stock.

LOS ANGELES

Southern California July sales show considerable reduction against June and are about 10 per cent under July, last year. Introduction of new models the latter part of the month brought marked stimulus to orders and widespread interest generally, with indications market will regain strength. Used car stocks are increasing though they are not heavy. Business generally is fairly good. The truck market is running under July last year, with falling off also from June sales. Used truck stocks are unusually heavy.

SAN FRANCISCO

Automobile sales in this territory for July were slightly ahead of June and considerably better than in July a year ago, due to price cuts and new models. Exact figures of registrations are not available, but association officials estimate increase at about 10 per cent over June. Used car sales show slight improvement, and good rebuilt cars are moving well. Trucks selling fairly in country due to very large fruit crops, but slowly in cities. General business is quiet with collections slow and new building construction below normal. Banks are becoming still tighter on financing used car purchases, though money is plentiful at low interest rates.

SEATTLE

Sales reported during July leaned to medium price cars. Summarizing the entire situation, the trade is in the same status that it normally is at this time of year. Used car dealers report a quiet market. Seattle and Northwest dealers are preparing to participate in the Pacific Northwest Merchants Exposition, to be held in Seattle during the week of Aug. 8.

AUSTIN

Favorable crop prospects and the placing of new models on the market are causing a large increase in automobile sales in Texas, according to retail dealers. Dealers are looking forward to a still better business in the fall months. During the last 18 months farmers have purchased comparatively few automobiles due to the low price of cotton last year. At present cotton crop conditions throughout the state are very favorable, and the price is much above that of last year.

MINNEAPOLIS

Crop prospects and arrival of new models have stimulated the automobile business in the Northwest. Branches are nearing an oversold condition on some of the new lines and retailers are writing in for more cars. It is evident that the trade is more optimistic as harvest time begins. Used car inventories have been lower than usual in July.

Michigan Sales Fall 26,000 in First Half

Nearly All Large Counties Show Reduction—Ford Sales Drop 7000

DETROIT, Aug. 1—According to a recapitulation of new car registration figures for Michigan in June, just issued by the Michigan Automotive Trade Association, a total of 15,458 new passenger cars were registered compared with 25,371 for June, 1926. The large part of this loss is recorded in Ford sales which aggregated 1566, compared with 8532 in the same month last year. Chevrolet sales were 3795, while for June, 1926, they totaled 3959.

New car registrations for the first half of the year are 86,887 compared with 112,640 last year. Wayne county, which embraces Detroit, is largely responsible for the falling off. Sales were 31,669 compared with 45,532.

Of the other large counties in the state, Genesee is the only one to register a sales gain. Sales in Genesee, which includes Flint, total 4673 cars for the first half compared with 4496 for the first six months of 1926.

Kansas City Decline Small

KANSAS CITY, Aug. 1—Motor car sales in Kansas City and Jackson county during the first half of 1927 showed only a small decline over the same period of 1926 and all the decrease was in the light car field. While the decrease in Kansas City was small —427 cars for the period—sales in St. Louis took a decided slump with a decrease of 2825 for the period.

Sales in Kansas City, which include Jackson county, for the period this year were 10,475 against 10,902 last year. The figures for St. Louis are 13,916 this year against 16,741 in 1926.

Ohio Shows June Decline

COLUMBUS, OHIO, July 28—The bureau of business research of the Ohio State University in its recent bulletin covering the registration of both passenger cars and commercial vehicles in 55 counties in Ohio in June, shows a decline from May this year. The falling off in passenger cars amounts to 16.9 per cent, while there was a decline of 10.8 per cent in commercial car registration. Cuyahoga county, with Cleveland, showed a decline of 11.6 per cent; Hamilton county, with Cincinnati, a decline of 18.8 per cent; Franklin county, with Columbus, a decline of 18.9 per cent; Lucas county, with Toledo, a decline of 23.2 per cent, and Summit County, with Akron, a decline of 21.5 per cent.

Fire Damages Brunn Plant

BUFFALO, Aug. 1—Brunn Carriage Mfg. Co. sustained a fire loss of about $30,000 in a blaze of undetermined origin last week.

Potato License Tags—the Ayes Have It

SPOKANE, WASH., July 30—A large Idaho potato is the the newest thing in automobile license plates. The state has adopted a tag representing a big brown potato for distribution next year. Numbers and other official information on the plate are painted green.

The secretary of state has ordered 120,000 sets of plates, and it is Idaho's intention to feature a different product each year. The potato was selected to lead the field because of the national reputation this Idaho product has gained. The importance of the industry is increasing from year to year and estimates of the 1927 crop vary from 22,000 to 30,000 carloads.

General Retail Business Shows Gain in First Half

WASHINGTON, Aug. 2—Retail sales for the first six months of this year, regarded as indicative of general business conditions, are found by the Federal Reserve Board, to be larger than in the corresponding period of 1926. The board finds that chain stores showed the most important increases, while sales of mail order houses and department stores averaged only slightly larger. Inventories were generally reduced in retail establishments over the whole country. Its figures showed the reduction to have carried stocks to about 1.5 per cent lower than the level of June last year.

Department stores sales were 0.3 per cent over those for the first six months of last year; mail order houses were 0.2 per cent increased. Sales in five and ten-cent chains increased 10.4 per cent. Grocery store chains increased 21.4 per cent; drug chains 15.1 per cent. Music store sales decreased 11.4 per cent.

Cooper Chairman of Board

NEW YORK, July 30—At a meeting of the board of directors of General Exchange Insurance Corp., C. C. Cooper, who has been president, was elected chairman of the board. Livingston L. Short, formerly vice-president, was elected to succeed Mr. Cooper as president. In addition, P. M. Hinrichs, manager of the underwriter department, and L. L. Lukes were elected vice-presidents.

Starts Eagle Plane Deliveries

KANSAS CITY, Aug. 1—The Eagle Aircraft Co. of Kansas City has started delivery of 50 planes sold to the New York distributors for delivery this year. The company here has contracted with the New York concern to build 500 planes for it over a period of years.

Lake Coal Carriers Now Carrying Cars

Milwaukee Builds New Terminal to Provide Adequate Unloading Facilities

MILWAUKEE, Aug. 1—Development of the new municipal terminal at Milwaukee on the outer harbor on Lake Michigan is giving notable recognition to the importance of the city as an automotive distributing center. One of the first steps to provide receiving facilities embraces provision for handling cars shipped from Cleveland, Buffalo, Toledo, Detroit and other Great Lakes automotive production centers, and outgoing shipments from passenger car and truck factories in Milwaukee, Hartford, Racine and Kenosha.

Construction of loading platforms and ramps is under way, following the completion of docks. The latest development has brought to light the fact that use is being made of the large bulk freighters to carry automobiles. Lake vessels loaded with coal on Lake Erie ports for Milwaukee have now been pressed into service to carry an auxiliary load of automobiles on deck, occupying the hatches and intervening space. This has made necessary provision for ramps. Sixteen-foot loading platforms with grooved runways into which the car wheels fit are attached to inclined runways, 9 ft. wide, leading to the ground. One ramp, 13 ft. high, will be used to unload cars from coal carriers without cargo, and another ramp, 7 ft. high, serves laden vessels.

Extra dredging has been done alongside the docks to accommodate the heavier and deeper draft bulk freighters. The original docks were designed to unload automobiles from ordinary freight boats which discharge cargoes through the usual apertures in the sides of the hulls which are on a level with the dock platform proper. In the case of the bulk freighters, the ramps and platforms obviate the necessity of using heavy and expensive cranes for unloading.

Milwaukee is the principal receiver of coal on the Great Lakes and through the new facilities the receipt of automobiles by water is expected to give it distinction in this instance as well.

Rules on Knockdown Cars

WASHINGTON, Aug. 2—A tariff decision which will affect the automobile importers of this country, as well as importers of other commodities, has just been announced by the U. S. Customs Court here. The gist of the decision is that when parts of an automobile, or other machines, are entered through the customs at New York in a knocked down condition, each part is a separate article of importation and must be stamped conspicuously with the country of origin. For failure to comply with the law the importer is subject to a 10 per cent penalty.

Automotive Buying Leads Steel Revival

Tonnages Conservative But Show Improvement—Prices Show Little Change

NEW YORK, Aug. 4—Some encouraging orders for full-finished automobile sheets and other automotive steel products have been placed and additional commitments are reported to be in process of negotiation. Nearly all of this business is for prompt shipment, specifications accompanying or following on the heels of orders. Tonnages involved, while considerably improved, are still conservative, but the impressive feature of this business is that automotive consumers are once more taking the lead in the revival of the steel market.

Aside from a slight downward readjustment in prices for automotive alloy steels, prices at the opening of August show little change from those which prevailed a month ago. Three per cent nickel-steel bars (S.A.E. 2300), in round tonnages are quoted at $4.15 Pittsburgh, per 100 lb., as compared with $4.30 at the beginning of July, but on most of the automotive alloy steels the reduction does not exceed $1 per ton.

In hot-rolled steel bars there is a disposition on the part of mills to make a firmer stand for full prices. Hot-rolled steel bars have suffered from their association with shapes and plates, the three descriptions usually referred to as heavy-rolled products. With a better demand for cold-finished bars anticipated from automotive consumers, greater uniformity in the hot-rolled market would strengthen the position of the finishers.

Automotive demand for strip-steel and stripsheets is so active that producers enjoy the best rate of operations, mills running in some instances at very close to capacity.

Pig Iron—Melters are bringing considerable pressure to bear on prices and inquiries "at a price" are numerous, with the result that in some of the markets concessions of 50 @ 75c a ton have been made on both foundry and malleable. Some blast furnace interests are planning curtailment of output as a relief measure.

Aluminum—Virtually no changes have taken place in the situation, automotive consumers continuing to buy largely from hand to mouth. The market for remelted metal continues soft. According to estimates made by European authorities, consumption of aluminum during the first half of 1927 was 10 per cent higher than in the corresponding period of 1926 which, in turn, showed a 30 per cent increase over the first half of 1925.

Copper—Improvement in the copper market has been almost solely due to better export demand. There has been no appreciable broadening in the demand for copper and brass products, and, therefore, domestic sales of unwrought metal have been relatively a small factor in the price advance.

Tin—Speculative activities in the London market are again the dominant influence in the metal's ups and downs. Domestic consuming demand is routine in character.

Lead—Consuming demand, especially from storage battery manufacturers continues good, in spite of further price advances.

Zinc—Amid good consuming inquiry the market rules firm.

Yellow Truck Shows Improved Quarter

DETROIT, July 30—The Yellow Truck & Coach Mfg. Co. reports net loss of $55,463 for the quarter ended June 30, compared with a loss of $668,190 during the first quarter. The statement reveals a net loss for the first half of the year, after depreciation and provision for income taxes, of $723,653. Sales for this same period totaled $17,431,481, of which $9,722,822 were made in the second quarter, compared with $7,708,658 in the first quarter.

Paul W. Seiler, who assumed the presidency of the company last spring, declared that the new line of trucks powered by Buick engines and recently introduced to the trade, have been favorably received and will, it is hoped, improve the earning power of the company.

Twin-Coach Production Starts in Kent Plant

CLEVELAND, Aug. 1—Production of the twin-coach is now under way at the plant of the Twin Coach Corp., Kent, Ohio. This plant was formerly that of the Fageol Co. of Ohio and was purchased by Frank R. Fageol from the American Car & Foundry Co. following the merger of the two companies.

The first order for twin coaches has been placed by the Chicago Surface Lines. Other purchasers reported are the Northcoast Transportation Co., Tacoma; Shore Line Motor Coach Co., Gary, Ind.; Safety Motor Coach Lines of Chicago, Boston Elevated Railway, Auto Interurban Co., Spokane, Milwaukee Electric Railway & Light Co. and the Twin City Rapid Transit Co., Minneapolis.

Takes Over Steel Plant

HARTFORD, CONN., Aug. 2—The plant of the Connecticut Electric Steel Co. here has been leased by John D. Scott, who will operate it for the manufacture of high grade steel castings and ultimately for steel production. For the present the plant will be operated under Mr. Scott's name. Later it is planned to form a corporation.

Stutz Wins at Brooklands

INDIANAPOLIS, Aug. 1—Word has been received by Stutz Motor Car Co. of America, Inc., of the victory of one of its cars in a 15-mile stock car race at Brooklands, England, the car averaging 89.5 m.p.h. The car was entered and driven by Col. Warwick Wright, Stutz distributor in England.

New York Bus Lines to Cover 86 Routes

Orders for Operating Equipment Seen Ranking With Largest Ever Placed

NEW YORK, Aug. 2—Contracts for several hundred buses for operation in New York City are to be placed as the result of the action of the board of estimate in awarding franchises for 86 routes within the greater city, on a five-cent fare basis.

Although the franchises were awarded and signed, there are some final legal steps to be taken. Pending this action, the prospective holders of the franchises will say nothing regarding their plans for operation, and what sizes and types of buses and bodies are to be used. There is no doubt, however, that the orders arising out of the city's authorization of bus routes will be among the largest ever placed.

Prominent among the operators is the Equitable Coach Co., which will have seven crosstown routes in Manhattan, 24 in Brooklyn, and 25 in Queens. The fare will be five cents, with three zoned routes in Queens. The charge for transfers will be two cents.

The company has announced its readiness to make an investment of $16,000,000 or more and will give the city 5 per cent of its gross receipts, with a guaranteed minimum return of $400,000 a year. The franchise is for five years, with privilege of renewal for five years more. The financing of the company is guaranteed by J. G. White & Co., owners and operators of public utilities, and the operation will be by the J. G. White Management Corp., of which John H. Pardee is president.

The Equitable company is also backed by the American Car & Foundry Motors Co., so operation of A. C. F. buses, at least in part, is virtually assured.

The board of estimate awarded the Bronx bus franchise, 12 routes, to the Surface Transportation Corp., a subsidiary of the Third Avenue Railway Co., and the franchise for Staten Island, 18 routes, to the Tompkins Bus Corp. Both franchises call for five-cent fares, with some zoned routes and a 5 per cent return of gross receipts to the city in the case of the Surface company and 3 per cent in the case of the Tompkins company.

Stinson to Expand Plant

DETROIT, Aug. 1—Expansion of the plant of the Stinson Aircraft Co. at Northville is being planned by the company according to Eddie Stinson, its president. Since his winning of the National Air Tour, orders for his new monoplane have increased. A 55-acre landing field at Northville has been presented to the Stinson company for five years, with an option to purchase at the end of this period.

Chrysler Earnings Increase $2,270,005

Sales in First Six Months Over 100,000 Cars—Officers Named to Board

DETROIT, July 30—Chrysler Corp. reports net profit for the first half of 1927 as $10,116,749, after charges and Federal taxes, equivalent after preferred dividend requirements to $3.41 a share earned on 2,707,080 shares of no par common stock. This compares with $7,846,744 or $2.58 a share earned in the first half of 1926, an increase of $2,270,005 or 28.9 per cent. Surplus after dividends was $5,196,414.

Net profit for the June quarter was $5,724,180 or $1.95 a share, against $4,382,569 or $1.46 a share, in the March quarter, and $4,287,055 or $1.42 a share in the June quarter last year.

Current assets as of June 30 totaled $48,480,724 and current liabilities, $11,762,396, a ratio of 4.12 to one. In the year since June 30, 1926, working capital has increased about $10,500,000. Inventories have decreased nearly $2,000,000 since Jan. 1, 1927, and cash and securities have increased more than $7,000,000, to about $24,000,000.

Fred N. Zeder, vice-president in charge of engineering; J. E. Fields, vice-president in charge of sales; K. T. Keller, vice-president in charge of manufacturing, and Harold Talbott, were elected to the board of directors.

Sales in the first six months were over 100,000 cars, an increase of 30 per cent in units and 12 per cent in dollar value over the same period last year, W. P. Chrysler, president, said. New car stocks in dealers' hands were equal to 6.9 weeks' sale, compared with 7.6 weeks' for the same time last year.

Coast Bumper Companies Launch Expansion Plan

LOS ANGELES, Aug. 1—A joint $300,000 expansion program of United States Spring Co., Inc., and United States Bumper Co., Inc., both of Los Angeles, is under way in the central manufacturing district. This expansion was to have been started about three years ago, when the late president of both companies, Philip Riedele, went East to purchase machinery for a new plant, but died before his plans were completed.

The new plant will be built to provide for almost five times as great a production of bumpers and springs as has been possible in the old plants, declares John B. Rauen, secretary and treasurer of both companies. Whereas in the present quarters a combined tonnage of 250 to 300 tons per month represents capacity production, the new plant will be capable of turning out from 1250 to 1500 tons of finished products. Floor space in the old plants totals 25,000 sq. ft., the new unit will provide for 66,500 sq. ft. The building now occupied by United States Spring Co. will be retained as a sales and service department for both springs and bumpers.

The United States Bumper Co. operates as the exclusive licensee of the C. G. Spring & Bumper Co. in six Pacific Coast States.

Mack Trucks Shows $3,677,749 Earnings

NEW YORK, Aug. 3—Net profit of Mack Trucks, Inc., in the first half of 1927 was $3,677,749 after charges, or $4.36 a share on the 713,434 common shares. This compares with $5,341,328, or $7.80 a share on 611,515 shares of common, in the first half of 1926.

For the June quarter, net earnings were $2,218,435, comparing with $1,459,304 in the March quarter, and with $3,025,799 in the June quarter last year.

Shipments and earnings in the first and second quarters were slightly in excess of estimates, a company statement said. Notes and accounts receivable have been reduced more than $10,000,000 since the new terms went into effect. Neither the company nor its subsidiary, Mack Acceptance Corp., has any bank loans, and there is more than $5,000,000 cash on hand.

Walter E. Reid, of Portland, Me., one of the largest individual stockholders, was elected a director.

C.I.T. Earns $1,288,353

NEW YORK, Aug. 3—Commercial Investment Trust Corp. reports net profits of $1,288,353 for the six months ended June 30. The volume of bills and accounts purchased during this period totaled $90,000,000. In the second half of the year the company expects to feel the benefit of important contracts with Hudson Motor Car Co. and Reo Motor Car Co., Henry Ittleson, president, said. Purchases of motor car paper were smaller in the first six months of 1927 than in the same period last year but gains were shown in the industrial department, which is devoted to business other than motor car paper. Both the English and German subsidiaries continue to show satisfactory growth, Mr. Ittleson said.

Wright Earnings Gain

PATERSON, N. J., Aug. 3—Wright Aeronautical Corp. reports net earnings in the first half of 1927 as $355,741, which compares with $323,148 in the first half of 1926. Earnings in the June quarter were $222,071 as against $133,670 in the first quarter.

World Bestos Sales Double

PATERSON, N. J., Aug. 3—World Bestos Corp. reports business in the first six months of the year doubling that of the same period of 1926. The distribution organization of the company has been increased.

Financial Notes

Commercial Credit Corp., New York, affiliated with Commercial Credit Co., Baltimore, reports net earnings after all charges of $359,380 for the first six months of 1927. In this period the gross receivables amounted to $39,710,444. Of motor lien retail time sales notes, $19,326,541, outstanding June 30, only $49,024 was more than 60 days past due according to original contract terms. Appraised value on repossessed cars in the company's possession was $98,956. Unused credit loans with depository banks June 30 totaled $2,750,000.

American-LaFrance Fire Engine Co., Inc., reports for quarter ended June 30, 1927, net profit of $13,388 after interest, etc., equivalent to 33 cents a share earned on 40,000 shares of 7 per cent preferred stock. This compares with net loss of $32,412 in preceding quarter and net profit of $202,913, equal to 29 cents a share (par $10) earned on 449,300 shares of common stock, after preferred dividends in second quarter of 1926. Net loss for first six months of 1927 amounted to $19,024 after above charges, against net profit of $406,204.

Fisk Rubber Co. and subsidiaries report for eight months ended June 30, 1927, net profit of $1,717,307 after depreciation, interest and Federal taxes, equivalent after allowing for dividend requirements on 7 per cent first preferred, convertible and 7 per cent second preferred stocks to 88 cents a share on 825,244 shares of no par common stock. In previous year report covered six months ended April 30, 1926, and showed net profit of $2,124,593.

B. F. Goodrich Co. reports $7.62 a share earned on the common stock in the first half of 1927, after preferred dividends, as against 11 cents a share on the common in the first half of 1926, net incoming rising to $5,813,501 from $1,358,616. Net sales for the half year exceeded $69,000,000. Regular quarterly common and preferred dividends were declared.

Pierce-Arrow Motor Car Co. reports ratio of current assets, including a cash balance as of July 27 of $2,444,880, to current liabilities, had reached the point of nine to one. The company has recently purchased and paid for out of cash, $250,000 of 8 per cent gold debentures to be used for its 1928 sinking fund requirements.

Federal Motor Truck Co. reports for the six months ended June 30, 1927, net profit of $323,803 after depreciation, interest and Federal taxes, equivalent to 75 cents a share earned on 430,756 no par shares of stock, comparing with $1,069,729 or $5.35 a share (par $10) on 200,000 shares outstanding in the first half of 1927.

Westinghouse Air Brake Co. and subsidiaries for the first half of 1927 report a net income of $5,247,283, after depreciation and Federal taxes, equivalent to $6.61 a share earned on 793,027 shares of $50 par stock. This compares with $5,609,430 or $7.07 a share in the first half of 1926.

Lee Rubber & Tire Corp. reports for the first half of this year net profit of $485,491 after depreciation and interest. Net sales for the period totaled $6,010,385 and surplus as of June 30 increased to $1,087,390, compared with $587,593 on Dec. 31, 1926.

Welders to Discuss Automotive Practice

DETROIT, Aug. 1—A number of papers of automotive interest will be read and discussed at the 1927 fall meeting of the American Welding Society to be held in Detroit, Sept. 19 to 23. The opening session on Tuesday morning will be devoted to airplane welding and two papers, by J. B. Johnson, chief of the material branch, Air Corps, and by a representative of the Atlantic Aircraft Corp., will be presented.

Wednesday morning W. C. Happ, chief engineer of the department of methods and standards of the Studebaker Corp. of America, will present a paper dealing with automobile welding. It is planned to have this paper discussed by representatives of a number of automobile companies.

In connection with the convention, and in collaboration with the National Steel & Machine Tool Exposition to be held in Detroit during that week, there will be a welding and cutting exposition, some 10,000 sq. ft. of the convention hall having been set aside for exhibits of this nature.

Argentine Tire Imports from U. S. Increase 31%

WASHINGTON, Aug. 2—Argentine, during 1926, proved to be the best foreign market for American manufacturers of rubber tires and tubes, according to the figures just announced by the U. S. Department of Commerce. Total rubber exports from the United States to Argentina was $5,016,346, representing an increase of 31 per cent over the exports of 1925.

Of the total exports, 76 per cent was accounted for by casings and tubes. Automobile registration in that country increased from one vehicle to every 55 persons to one to every 45. The unit value of inner tubes increased from $1.76 per tube to $2.40 per tube in 1926, compared with the previous year.

Pioneer Donates Highway Memorial

CHICAGO, July 30—A fund of $250,000 donated for a concrete road that will serve as a permanent memorial, is Alexander Coleman's gift to Lee and Henry counties, Iowa. The highway is to be 10.5 miles long leading past the old Coleman homestead.

Alexander Coleman, the 88-year-old donor of the road, migrated to Iowa in 1847 with his father and settled on the homestead which he still owns. The road will be known as the Coleman road and it will be the longest stretch of paved county road in Iowa, the improvement not being on the primary highway system.

Atlantic City Schedules Three Stock Car Races

WASHINGTON, Aug. 2—Plans for the stock car races to be held at the Atlantic City Speedway on Labor Day, under the auspices of the Atlantic City Speedway Association, were announced this week by the American Automobile Association.

The program will consist of three events, a 25-mile race for four-cylinder cars; a 75-mile race for sixes listed under $2,000, and a free-for-all of 150 miles for cars listed under $1,500. There will be $5,000 in cash prizes and a permanent cup in each class.

Entries will close Aug. 20.

Distributor Adds Tire Line

SPOKANE, Aug. 1—Western Motor Co., distributor for Hupmobiles in this territory, has entered the wholesale and retail tire business, taking over the distribution of the Mason line in the same territory it serves for Hupp.

Germany Postpones Car Show to Spring

BERLIN, July 16 *(by mail)*—The German Makers' Association has decided to postpone the international car show which was to have been held at the end of this year in Berlin until next spring, the reason being that it would clash with the Belgian Salon. There is a possibility, however, of the German motorcycle makers holding a special show for themselves in spite of this resolution.

The spring show at Berlin is to be put on a very big footing. The City of Berlin has purchased the two great halls that have been built by the makers' association after having already secured ownership of all the ground property round about and intends developing a large and sumptuous exhibition quarter on this site, the first steps in this direction already being taken.

Thus now three big halls lying in the immediate vicinity of one another are in the city's possession and connected with one another. There is plenty of room for further extensive buildings and the spring show may therefore have a very large and well situated territory at its disposal. It is intended to exhibit not only passenger cars but also, as at Cologne, trucks, municipals and similar utility vehicles, as well as motorcycles and accessories of all kinds.

Manila Hire Cars Increased

WASHINGTON, July 30—The drive-your-self idea is making a big hit with the Philippine automotive using public, according to a report just made to the automotive division of the Department of Commerce. The department is advised that in the City of Manila alone there are, according to registration figures, 40 garages offering drive-your-self cars, having in operation 600 machines—an increase of 100 machines over the 1926 registration.

Calendar of Coming Events

SHOWS

American Electric Railway Association, Public Auditorium, Cleveland..Oct. 3-7
American Road Builders Association, Public Auditorium, Cleveland..Jan. 9-13
Automotive Equipment Association, Coliseum, Chicago .....Nov. 7-12
*Chicago, National Automobile Chamber of Commerce, Coliseum Jan. 28-Feb. 4
International Aviation Exhibition, Copenhagen .....Aug. 20-Sept. 2
London Passenger Car Show....Oct. 14-22
London Truck Show .....Nov. 17-26
Machine Tool Exhibition, New Haven, Conn. .....Sept. 6-9
Machine Tool Exposition, National Machine Tool Builders' Association, Public Auditorium, Cleveland Sept. 19-23
National Standard Parts Association, Convention Hall, Cleveland..Nov. 14-19
*New York, National Automobile Chamber of Commerce, Grand Central Palace .....Jan. 7-14
Paris, Grand Palais .....Oct. 6-16
Salon, Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 28-Feb. 4
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles.....Feb. 11-18
Salon, Automobile Salon, Inc., Hotel Commodore, New York..Nov. 27-Dec. 3
Salon, Automobile Salon, Inc., Hotel St. Francis, San Francisco Feb. 25-March 3

*Will have special shop equipment exhibit.

CONVENTIONS

American Chemical Society, Detroit, Sept. 6-8
American Electric Railway Association, Public Auditorium, Cleveland..Oct. 3-7
American Road Builders' Assn., Hotel Hollenden, Cleveland .....Jan. 9-13
American Society of Mechanical Engineers, Machine Shop Practice, New Haven, Conn. .....Sept. 7-9
American Society of Mechanical Engineers, First National Fuels Meeting, St. Louis .....Oct. 10-13
American Society for Steel Treating, Convention Hall, Detroit....Sept. 19-24
Automotive Equipment Association, Coliseum, Chicago .....Nov. 7-12
International Congress for Testing Materials, Amsterdam .....Sept. 12-17
Motor and Accessory Manufacturers Association, Credit, Detroit..Sept. 14-16
National Safety Council, Stevens Hotel, Chicago .....Sept. 26-30
National Standard Parts Association, Hotel Hollenden, Cleveland..Nov. 14-19
National Tire Dealers' Association, Louisville, Ky. .....Nov. 15-17
World Motor Transport Congress, London .....Nov. 14-17

S. A. E.

National

Chicago, November—National Transportation and Service Meeting.
Chicago, Dec. 1—Tractor Meeting.
Cleveland and Detroit, Sept. 19-22—Production Meeting.
Detroit, Jan. 24-27—Annual Meeting.
New York, Jan. 12—Annual Dinner.

RACES

Altoona, Pa. .....Sept. 5
Atlantic City .....Sept. 5
British Grand Prix, Brooklands....Oct. 1
Charlotte, N. C. .....Sept. 19
Detroit .....Sept. 10
Los Angeles .....Nov. 24
Salem, N. H. .....Oct. 12
Syracuse, N. Y. .....Sept. 3